# CHAPTER 4
# Environmental Consequences

## 4.1 Introduction

This chapter assesses environmental impacts that would occur due to the implementation of proposed action or the alternatives described in Chapter 2. The baseline affected environment, or existing condition, is described in Chapter 3.

### 4.1.1 Analytical Assumptions

The following impacts analysis was conducted with the following assumptions:

1. The laws, regulations, and policies applicable to BLM authorizing ROW grants for renewable energy development facilities would be applied consistently for all action alternatives.

2. The proposed facility would be constructed, operated, maintained and decommissioned as described in each action alternative.

3. Short-term impacts are those expected to occur during the construction phase and the first five years of the operation and maintenance phase. Long-term impacts are those that would occur after the first five years of operation.

### 4.1.2 Types of Effects

The potential impacts from those actions that would have direct, indirect, and cumulative effects were considered for each resource. Effects and impacts as used in this document are synonymous and could be beneficial or detrimental.

Direct effects are caused by the action and occur at the same time and place as the action; indirect effects are caused by the action and occur later in time or further in distance, but are still reasonably foreseeable. 40 CFR 1508.8. Cumulative impacts are those effects resulting from the incremental impacts of an action when combined with other past, present, and reasonably foreseeable future actions (regardless of which agency or person undertakes such actions). 40 CFR 1508.7. Cumulative impacts could result from individually insignificant but collectively significant actions taking place over a period of time.

Section 1502.16 of the CEQ regulations forms the scientific and analytic basis for the comparisons of alternatives as described under 40 CFR 1502.14, Alternatives including the Proposed Action. The environmental consequences chapter (FEIS Chapter 4) consolidates the discussions of those elements required by sections 102(2)(C)(i), (ii), (iv), and (v) of NEPA which

are within the scope of this EIS and as much of Section 102(2)(C)(iii) as is necessary to support the comparisons. The discussion includes the environmental impacts of the alternatives, including any adverse environmental effects which cannot be avoided, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented.

### 4.1.3 Resources and Resource Uses Not Affected or Present in the Action Area

Resources, BLM program areas or other aspects of the human environment that are not affected or present in the GSEP area include: environmental justice; wild and scenic rivers; national scenic or historic trails, monuments, recreation areas, or conservation areas; cooperative management and protection areas; outstanding natural areas; forest reserves; back country byways; wetlands; livestock grazing; and wild horse and burros.

### 4.1.4 Cumulative Scenario Approach

This PA/FEIS analyzes the cumulative impact of the construction, operation and maintenance, closure and decommissioning of the GSEP project ROW grant, taking into account the effects in common with other past, present, and reasonably foreseeable future actions. The cumulative effects analysis highlights past actions that are closely-related either in time or space (i.e., temporally or in geographic proximity) to the proposed action, present actions that are ongoing at the same time this EIS was being prepared; and reasonably foreseeable future actions, including those for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends.

The intensity, or severity, of cumulative impacts considers the magnitude, geographic extent, duration and frequency of the effects (CEQ, 1997). The magnitude of the effect reflects the relative size or amount of the effect; the geographic extent considers how widespread the effect may be; and the duration and frequency refer to whether the effect is a one-time event, intermittent, or chronic (CEQ, 1997). If the proposed action and alternatives would have no direct or indirect effects on a resource, the PA/FEIS does not analyze potential cumulative effects on that resource. See, for example, Section 4.1.3, Resources and Resource Uses Not Affected or Present in the Action Area.

For the proposed action, the cumulative scenario includes projects identified in Table 4.1-1 (Cumulative Scenario). Table 4.1-1 identifies each resource or BLM program, the cumulative analysis impact area (which is the geographic scope for each cumulative effects issue), elements to consider, BLM renewable projects, other BLM authorized actions and other known actions or activities that are located or would occur within the cumulative analysis impacts area. Most of the projects listed below have been, are being, or would be required to undergo their own independent environmental review under NEPA or CEQA or both, as applicable. Figure 2-5 identifies existing and reasonably foreseeable future projects along the I-10 Corridor. Table 4.1-2 identifies projects in the immediate vicinity of the I-10 corridor.

**TABLE 4.1-1**
**CUMULATIVE SCENARIO**

| Resource or BLM Program | Cumulative Analysis Impact Area | Elements to Consider | BLM Renewable Energy Projects | Other BLM Authorized Actions | Other Known Actions/Activities |
|---|---|---|---|---|---|
| Air Resources | Mojave Desert Air Basin | PM2.5, PM10, ozone | Blythe, Genesis, Rice, Palen, Desert Sunlight, Chuckwalla, Eagle Crest Pump Storage, Nextera McCoy, Bullfrog Big Maria Vista, Desert Quartzite, EnXco, Eagle Mountain Soleil, Mule Mountain Solar, Associated Gen-tie Trans Lines, | Eagle Mtn Landfill, D-PV2, Colorado River Substation, Red Bluff Substation, DSW Trans Line, OHV, LTVAs, | I-10, Blythe Airport Solar 1, Chuckwalla Valley Raceway, |
| Global Climate Change | International, national and regional | CO2e | All | | |
| Cultural Resources | Cultural sites, traditional use areas, and cultural landscapes on the plant site, along the linear facilities corridor and in the general vicinity of the site, including along the I 10 corridor | Ground-disturbing activities and the cultural character of the site and its vicinity.<br>Cultural resources, including archaeological (prehistoric and historic), and ethnographic resources. | See Figure 2-5, which includes: | | |
| | | | Blythe, Genesis, Rice, Palen, Desert Sunlight, Chuckwalla, Eagle Crest Pump Storage, Nextera McCoy, Bullfrog Big Maria Vista, Desert Quartzite, EnXco, Mule Mountain Solar, Associated Gen-tie Trans Lines, etc. | Eagle Mtn Landfill, D-PV2, Colorado River Substation, Red Bluff Substation, DSW Trans Line, OHV, LTVAs. Etc. | Blythe Airport Solar 1, Chuckwalla Valley Raceway, various commercial and residential projects, etc. |
| Lands and Realty | Eastern Riverside County | Designated utility corridors (e.g., transmission lines, cellular telephone towers, poles), existing ROWs, I-10 | Blythe, Genesis, Rice, Palen, Desert Sunlight, Chuckwalla, Eagle Crest Pump Storage, Bullfrog Big Maria Vista, Desert Quartzite, EnXco, Eagle Mountain Soleil, Mule Mountain Solar, Associated Gen-tie Trans Lines, | Eagle Mtn Landfill, D-PV2, Colorado River Substation, Red Bluff Substation, DSW Trans Line, OHV, LTVAs, | Blythe Airport Solar 1, Chuckwalla Valley Raceway, |
| Multiple Use Classes | CDCA Plan areas bearing the multiple use class designation “Limited” | Restriction or preclusion of otherwise allowable use opportunities | McCoy Soleil, Mule Mountain Solar, maybe also Red Bluff Substation | None | Blythe Airport Solar 1, First Solar’s Blythe |
| Noise | Five mile radius around GSEP site | Equipment, motor vehicles, high pressure steam blow | None | None | None |
| Paleontological Resources | Eastern Riverside County | Ground-disturbing activities; rock units with potential high sensitivity or known paleontological resources | Blythe, Genesis, Rice, Palen, Desert Sunlight, Chuckwalla, Eagle Crest Pump Storage, Nextera McCoy, Bullfrog Big Maria Vista, Desert Quartzite, EnXco, Eagle Mountain Soleil, Mule Mountain Solar, Associated Gen-tie Trans Lines, | Eagle Mtn Landfill, D-PV2, Colorado River Substation, Red Bluff Substation, DSW Trans Line, OHV, LTVAs, | Blythe Airport Solar 1, Chuckwalla Valley Raceway, |

**TABLE 4.1-1 (Continued)**
**CUMULATIVE SCENARIO**

| Resource or BLM Program | Cumulative Analysis Impact Area | Elements to Consider | BLM Renewable Energy Projects | Other BLM Authorized Actions | Other Known Actions/Activities |
|---|---|---|---|---|---|
| Public Health and Safety | | | | | |
| Hazardous materials/ hazardous waste | Mojave Desert Air Basin, watershed, groundwater basin, with focus on and in the vicinity of the site | Releases, spills, emissions, bacteria; ground disturbance that exposes existing subsurface conditions; engineering and administrative controls; health risks | See Air Resources, above; see also, Water Resources, below, in this Table 4.1-1. | | |
| Waste management | California Desert, with emphasis on Riverside County | Solid and liquid wastes | Blythe, Genesis, Palen, Desert Sunlight, Chuckwalla, Eagle Crest Pump Storage, Nextera McCoy, Bullfrog Big Maria Vista, Desert Quartzite, EnXco, Eagle Mountain Soleil, Mule Mountain Solar, Associated Gen-tie Trans Lines | Eagle Mtn Landfill, D-PV2, Colorado River Substation, Red Bluff Substation, DSW Trans Line, OHV, LTVAs | Blythe Airport Solar 1, Chuckwalla Valley Raceway |
| Transmission line safety and nuisance | Immediate vicinity of the proposed line | Interference with radio-frequency communication; noise; fire hazards; hazardous shocks; nuisance shocks; and electric and magnetic field (EMF) exposure | Big Maria Solar, Blythe Energy Project Transmission Line, Colorado River Substation and Expansion, Desert Quartzite, Palen, Chuckwalla Solar I | West-wide Section 368 Energy Corridors, Devers-Palo Verde Transmission Line, Blythe Energy Project | Interstate 10 |
| Aviation safety | Air space governed by the Blythe Airport Land Use Compatibility Plan | Navigable airspace; reflectivity and temporary flash occurrences; radio frequency emissions and potential interference; thermal plumes; height and location of structures; clear space within Compatibility Zone D; bird strike and avian-aviation incompatibilities | All | | |
| Traffic and transportation safety | I-10 corridor | Equipment that exceeds roadway load or size limits; hazardous materials transport | Same as Cultural Resources, above. | | |
| Worker safety and fire protection | GSEP site and linear facilities corridor; jurisdictional boundary of the Riverside County Fire Department (RCFD) plus mutual aid agencies | Site access; fire response; hazardous materials response; advanced life support/paramedic services; disaster preparedness | Blythe, Genesis, Rice, Palen, Desert Sunlight, Chuckwalla, Eagle Crest Pump Storage, Nextera McCoy, Bullfrog Big Maria Vista, Desert Quartzite, EnXco, Eagle Mountain Soleil, Mule Mountain Solar, Associated Gen-tie Trans Lines | Eagle Mtn Landfill, D-PV2, Colorado River Substation, Red Bluff Substation, DSW Trans Line, OHV, LTVAs | Blythe Airport Solar 1, Chuckwalla Valley Raceway |

**TABLE 4.1-1 (Continued)**
**CUMULATIVE SCENARIO**

| Resource or BLM Program | Cumulative Analysis Impact Area | Elements to Consider | BLM Renewable Energy Projects | Other BLM Authorized Actions | Other Known Actions/Activities |
|---|---|---|---|---|---|
| Public Health and Safety (cont.) | | | | | |
| Geologic hazards | GSEP site and linear facilities corridor | Accelerated and/or environmentally harmful soil erosion; corrosive soils; earthquake fault ruptures; earthquake induced ground deformations (e.g. lateral spreading, subsidence, liquefaction, or collapse), or otherwise unstable soils; landslides. | Big Maria Vista Solar, Blythe Energy Project Transmission Line, Colorado River Substation and Expansion, Desert Quartzite, Palen, Chuckwalla Solar I | West-wide Section 368 Energy Corridors, Devers-Palo Verde Transmission Line, Blythe Energy Project | Interstate 10 |
| Recreation | California Desert, with emphasis on eastern Riverside County | Dispersed recreational opportunities and experiences, ACECs, LTVAs | Blythe, Genesis, Rice, Palen, Desert Sunlight, Chuckwalla, Eagle Crest Pump Storage, Nextera McCoy, Bullfrog Big Maria Vista, Desert Quartzite, EnXco, Eagle Mountain Soleil, Mule Mountain Solar, Associated Gen-tie Trans Lines | Eagle Mtn Landfill, D-PV2, Colorado River Substation, Red Bluff Substation, DSW Trans Line, OHV, LTVAs, | Blythe Airport Solar 1, Chuckwalla Valley Raceway, |
| Social Economics | Social: Eastern Riverside County<br>Economic: Riverside County | Flow of goods and services; impacts to local infrastructure and services; ability to meet housing demand; employment/labor demand; possible positive impacts to regional economic sectors and/or adverse community impacts; severance or other tax benefits; ability of communities to absorb impacts. | Blythe, Genesis, Rice, Palen, Desert Sunlight, Chuckwalla, Eagle Crest Pump Storage, Nextera McCoy, Bullfrog Big Maria Vista, Desert Quartzite, EnXco, Eagle Mountain Soleil, Mule Mountain Solar, Associated Gen-tie Trans Lines, | Eagle Mtn Landfill, D-PV2, Colorado River Substation, Red Bluff Substation, DSW Trans Line, OHV, LTVAs, | Blythe Airport Solar 1, Chuckwalla Valley Raceway, |
| Soil Resources | Mojave Desert Air Basin and watershed | Erosion | See Air Resources, above; see also, Water Resources, below, in this Table 4.1-1. | | |
| Special Designations | Wilderness Areas within sight or hearing distance of the site (i.e., Palen/McCoy, Big Maria Mountains and Little Chuckwalla Mountains Wilderness Areas); more generally, the I-10 corridor | Views, glint, glare, noise, recreation | See related resource sections in this Table 4.1-1. | | |
| Transportation and Public Access | Transportation: Eastern Riverside County, focusing on the I-10 corridor<br>Public Access: NECO Plan area | Construction traffic – materials and workers<br>OHV recreation opportunities, changes in viewscape, unauthorized routes; | I-10 Corridor: Same as Cultural Resources, above.<br>NECO Plan Area: See Figure 3.13-1, including GSEP, Genesis, Palen, Chuckwalla, First Solar/Desert Sunlight, etc.; see also cumulative projects identified for Vegetation Resources, below. | | |

**TABLE 4.1-1 (Continued)**
**CUMULATIVE SCENARIO**

| Resource or BLM Program | Cumulative Analysis Impact Area | Elements to Consider | BLM Renewable Energy Projects | Other BLM Authorized Actions | Other Known Actions/Activities |
|---|---|---|---|---|---|
| Public Health and Safety (cont.) | | | | | |
| Vegetation Resources | NECO Plan area | Ephemeral drainages and natural communities; special status plants; stabilized and partially stabilized dunes and sand transport corridors; invasive plants | See generally, Figure 3.13-1. | | |
| | | | Blythe, Genesis, Rice, Palen, Desert Sunlight, Chuckwalla, Eagle Crest Pump Storage, Nextera McCoy, Bullfrog Big Maria Vista, Desert Quartzite, EnXco, Eagle Mountain Soleil, Mule Mountain Solar, Associated Gen-tie Trans Lines, | Eagle Mtn Landfill, D-PV2, Colorado River Substation, Red Bluff Substation, DSW Trans Line, OHV, LTVAs, | Blythe Airport Solar 1, Chuckwalla Valley Raceway, |
| Visual Resources | I-10 corridor; Figure 3.19-3 | Project appearance; construction-related dust, light, glint and glare; views from key observation points | See Figure 2-5 and Figure 3.19-3, which include, for example: | | |
| | | | Blythe, Genesis, Rice, Palen, Desert Sunlight, Chuckwalla, Eagle Crest Pump Storage, Nextera McCoy, Bullfrog Big Maria Vista, Desert Quartzite, EnXco, Eagle Mountain Soleil, Mule Mountain Solar, Associated Gen-tie Trans Lines | Eagle Mtn Landfill, D-PV2, Colorado River Substation, Red Bluff Substation, DSW Trans Line, OHV, LTVAs | Blythe Airport Solar 1, Chuckwalla Valley Raceway |
| Water Resources | | | | | |
| Surface water | Chuckwalla Valley Watershed, Colorado River System | Hydrology and quality | Blythe, Nextera McCoy, Bullfrog Big Maria Vista, Desert Quartzite, Mule Mountain Solar, Associated Gen-tie Trans Lines, | D-PV2, Colorado River Substation, DSW Trans Line, OHV, LTVAs | First Solar Blythe, Blythe Airport Solar 1 |
| Groundwater | Chuckwalla Valley Basin, Colorado River Basin | Basin balance, levels and quality | Blythe, Nextera McCoy, Bullfrog Big Maria Vista, Desert Quartzite, Mule Mountain Solar | Colorado River Substation, DSW Trans Line, OHV, LTVAs | First Solar Blythe, Blythe Airport Solar 1 |
| Wildland and Fire Ecology | Eastern Riverside County | Mortality of plants and wildlife, loss of forage and cover; changes to the vegetation communities; spread of invasive plants; consequences of subsequent extreme weather events; air quality | | | |

**TABLE 4.1-1 (Continued)**
**CUMULATIVE SCENARIO**

| Resource or BLM Program | Cumulative Analysis Impact Area | Elements to Consider | BLM Renewable Energy Projects | Other BLM Authorized Actions | Other Known Actions/Activities |
|---|---|---|---|---|---|
| Water Resources (cont.) | | | | | |
| Wildlife Resources | Recovery Plan Area defined by NECO; Critical Habitat Unit defined by USFWS/CDFG; existing range or eastern Riverside County | Desert Tortoise, Mojave fringe-toed lizard, Couch's spadefoot toad, migratory birds, golden eagle, western burrowing owl, American badger, kit fox, Nelson's big horn sheep.<br>Also, mortality and injury; special status wildlife; wildlife movement and connectivity; indirect impacts, including from lighting, collisions and climate change. | Blythe, Genesis, Rice, Palen, Desert Sunlight, Chuckwalla, Eagle Crest Pump Storage, Nextera McCoy, Bullfrog Big Maria Vista, Desert Quartzite, EnXco, Eagle Mountain Soleil, Mule Mountain Solar, Associated Gen-tie Trans Lines | Eagle Mtn Landfill, D-PV2, Colorado River Substation, Red Bluff Substation, DSW Trans Line, OHV, LTVAs | Blythe Airport Solar 1, Chuckwalla Valley Raceway |

**TABLE 4.1-2**
**RENEWABLE ENERGY PROJECTS IN THE CALIFORNIA DESERT DISTRICT**

| BLM Field Office | Number of Projects & Acres | Total MW |
|---|---|---|
| Solar Energy | | |
| Barstow Field Office | 18 projects<br>132,560 acres | 12,875 MW |
| El Centro Field Office | 7 projects<br>50,707 acres | 3,950 MW |
| Needles Field Office | 17 projects<br>230,480 acres | 15,700 MW |
| Palm Springs Field Office | 17 projects<br>123,592 acres | 11,873 MW |
| Ridgecrest Field Office | 4 projects<br>30,543 acres | 2,835 MW |
| ***TOTAL – CA Desert District*** | ***63 projects***<br>***567,882 acres*** | ***47,233 MW*** |
| Wind Energy | | |
| Barstow Field Office | 25 projects<br>171,560 acres | n/a |
| El Centro Field Office | 9 projects (acreage not given for 3 of the projects)<br>48,001 acres | n/a |
| Needles Field Office | 8 projects<br>115,233 acres | n/a |
| Palm Springs Field Office | 4 projects<br>5,851 acres | n/a |
| Ridgecrest Field Office | 16 projects<br>123,379 acres | n/a |
| ***TOTAL – CA Desert District*** | ***62 projects***<br>***433,721 acres*** | n/a |

SOURCE: CEC, RSA (June 2010) Section B.3.4, Table 1A.

With the exception of climate change, which is a global issue, the BLM has identified the California desert as the largest area within which cumulative effects should be assessed for all disciplines. However, within the desert region, the specific area of cumulative effect varies by resource. For each resource, the geographic scope of analysis is based on the topography surrounding the GSEP and the natural boundaries of the resource affected, rather than jurisdictional boundaries. The geographic scope of cumulative effects often extends beyond the scope of the direct effects, but not beyond the scope of the direct and indirect effects of the proposed action and alternatives. Table 4.1-1 identifies the relevant geographic scope for each discipline's analysis of cumulative impacts.

In addition, each project in a region would have its own implementation schedule, which may or may not coincide or overlap with the proposed action's schedule. This is a consideration for short-term impacts from the GSEP. However, to be conservative, the cumulative analysis assumes that all projects in the cumulative scenario are built and operating during the operating lifetime of the proposed GSEP.

## Renewable Energy Projects Included in the Cumulative Scenario

A large number of renewable projects have been proposed on BLM managed land, State land, and private land in California. As of January 2010, there were 244 renewable projects proposed in California in various stages of the environmental review process or under construction. As of December 2009, 49 of these projects, representing approximately 10,500 MW, were planning on requesting American Recovery and Reinvestment Act funds from the Federal government. Solar, wind, and geothermal development applications have requested use of BLM land, including approximately one million acres of the California desert. State and private lands have also been targeted for renewable solar and wind projects. In addition, nearly 80 applications for solar and wind projects are being considered on BLM land in Nevada and Arizona. (CEC RSA June 2010) Renewable energy projects in BLM's California Desert District are identified in Table 4.1-2.

Large renewable projects now described in applications to the BLM and on private land are competing for utility Power Purchase Agreements, which will allow utilities to meet state-required Renewable Portfolio Standards. Not all of the projects listed will complete the environmental review process, and not all projects will be funded and constructed. It is unlikely that all of these projects will be constructed for the following reasons:

1. Not all developers will develop the detailed information necessary to meet BLM and Energy Commission standards. Most of the solar projects with pending applications are proposing generation technologies that have not been implemented at large scales. As a result, preparing complete and detailed plans of development (PODs) is difficult, and completing the required NEPA and CEQA documents is especially time-consuming and costly.

2. As part of approval by the appropriate Lead Agency under NEPA and/or CEQA (generally the BLM and/or Energy Commission), all regulatory permits must be obtained by the applicant or the prescriptions required by the regulatory authorities incorporated into the Lead Agency's license, permit or ROW grant. The large size of these projects may result in permitting challenges related to endangered species, mitigation measures or requirements, and other issues.

3. Also after project approval, construction financing must be obtained (if it has not been obtained earlier in the process). The availability of financing will be dependent on the status of competing projects, the laws and regulations related to renewable project investment, and the time required for obtaining permits.

The BLM reviewed the list of renewable energy projects on State and private lands that the Energy Commission evaluated (RSA Table 1B) and determined that several among them do not meet the standard for consideration within the NEPA Cumulative Analysis. Reasons include: (i) BLM's NEPA Handbook H-1790-1 states, "Analyzing future actions, such as speculative developments, is not required;"(ii) Where information about the status of a potential upcoming project is not available, it is impossible to determine what impacts would result from its construction, operation, maintenance or ultimate decommissioning and, without this data, there can be no reasoned analysis of additive, countervailing or synergistic effects; and (iii) a cumulative impact analysis appropriately is concerned with actions that are reasonably

foreseeable and not about possible projects that can be conceived of or imagined. Accordingly, the following renewable energy (wind and solar) projects that were considered by the Energy Commission are not considered by the BLM:

1. In Humboldt County: Bear River Ridge (70 MW);

2. In Shasta County: Padoma Wind Energy (175 MW);

3. In Montezuma Hills, Solano County: Shiloh III (200 MW); Montezuma Wind II (52-60); and Montezuma Hills Wind Project (34-37 MW);

4. In Sacramento County: Rancho Seco Solar Thermal (15-17 MW solar trough);

5. In Contra Costa County: Tres Vaqueros (42 MW wind repower);

6. In Stanislaus County: Stanislaus Solar Project I (20 MW solar PV) and Stanislaus Solar Project II (20 MW solar PV);

7. In Kings County: Sun City Project Phase 1 (20 MW solar PV) and Synapse Solar 2 (20 MW solar PV/solar thermal);

8. In Kern County: Maricopa Sun Solar Complex (350 MW Solar PV); Panoche Ranch Solar Farm (250 MW Solar PV); Monte Vista (126 MW Solar PV); Lost Hills (32.5 solar PV); Tehachapi Photovoltaic Project (20 MW solar PV); T, squared, Inc. (19 MW solar PV); Global Real Estate Investment Partners, LLC (solar PV); Recurrent Energy (solar PV); Man-Wei Solar (solar PV); Regenesis Power for Kern County Airports Dept.; Manzana Wind Project (246 MW); Pine Canyon (150 MW); and Aero Tehachapi (65 MW).

9. In San Bernardino County: Boulevard Associates (20 MW solar PV);

10. In Los Angeles County: Gray Butte Solar PV (150 MW Solar PV) and NRG Alpine Suntower (40 MW solar PV and 46 MW solar thermal);

11. In Brawley / Imperial County: Orni 18, LLC Geothermal Power Plant (49.9 MW) and Black Rock Geothermal 1,2,and 3; and

12. In the City of Vernon: North Sky River Energy Project (300 MW).

Solar, wind and geothermal energy projects identified and analyzed by the Energy Commission as being on State and private lands that also are considered by the BLM are identified in Table 4.1-3. Proposed solar energy projects within BLM's cumulative scenario also are shown on Figure 2-5.

## Other BLM-Authorized Actions and Known Actions/Activities in the Cumulative Scenario

Other existing BLM authorized actions and other known actions/activities along the I-10 corridor in Eastern Riverside County are identified in Table 4.1-4.

**TABLE 4.1-3**
**RENEWABLE ENERGY PROJECTS ON STATE AND PRIVATE LANDS**

| Project Name | Location | Status |
|---|---|---|
| Solar Projects | | |
| Solargen Panoche Valley Solar Farm (400 MW Solar PV) | San Benito County | EIR in progress |
| San Joaquin Solar 1 and 2 (107 MW Solar hybrid) | Fresno | Under environmental review |
| Palmdale Hybrid Power Project Unit 1 (50 MW solar thermal, part of a hybrid project) | City of Palmdale | Under environmental review |
| Lucerne Valley Solar (50 MW solar PV) | San Bernardino | Under environmental review |
| Abengoa Mojave Solar Project (250 MW solar thermal) | San Bernardino County, Harper Lake | Under environmental review |
| Rice Solar Energy Project (150 MW solar thermal) | Riverside County, north of Blythe | Under environmental review |
| 3 MW solar PV energy generating facility | San Bernardino County, Newberry Springs | MND published for public review |
| Blythe Airport Solar 1 Project (100 MW solar PV) | Blythe, California | MND published for public review |
| First Solar's Blythe (21 MW solar PV) | Blythe, California | Under construction |
| California Valley Solar Ranch (SunPower) (250 MW solar PV) | Carrizo Valley, San Luis Obispo County | Under environmental review |
| LADWP and OptiSolar Power Plant (68 MW solar PV) | Imperial County, SR 111 | Under environmental review |
| Topaz Solar Farm (First Solar) (550 MW solar PV) | Carrizo Valley, San Luis Obispo County | Under environmental review |
| AV Solar Ranch One (230 MW solar PV) | Antelope Valley, Los Angeles County | Under environmental review |
| Bethel Solar Hybrid Power Plant (49.4 MW hybrid solar thermal and biomass) | Seeley, Imperial County | Under environmental review |
| Mt. Signal Solar Power Station (49.4 MW hybrid solar thermal and biomass) | 8 miles southwest of El Centro, Imperial County | Under environmental review |
| Wind Projects | | |
| Alta-Oak Creek Mojave Project (up to 800 MW) | Kern County, west of Mojave | Under environmental review |
| PdV Wind Energy Project (up to 300 MW) | Kern County, Tehachapi Mountains | Approved |
| Iberdrola Tule Wind (200 MW) | San Diego County, McCain Valley | EIR/EIS in progress |
| AES Daggett Ridge (84 MW) | San Bernardino | EIS in progress |
| Granite Wind, LLC (81 MW) | San Bernardino | EIR/EIS in progress |
| Solano Wind Project Phase 3 (up to 128 MW) | Montezuma Hills, Solano County | Under environmental review |
| Hatchet Ridge Wind Project | Shasta County, Burney | Under construction |
| Lompoc Wind Energy Project | Lompoc, Santa Barbara County | Approved |
| Pacific Wind (Iberdrola) | McCain Valley, San Diego County | Under environmental review |
| TelStar Energies, LLC (300 MW) | Ocotillo Wells, Imperial County | Under environmental review |
| Geothermal Projects | | |
| Buckeye Development Project | Geyserville, Sonoma | Under environmental review |

SOURCE: CEC RSA June 2010 Section B.3.4, Table 1B. The CEC compiled this list from the projects on CEQAnet as of November 2009 and the projects located on private or State lands that are listed on the Energy Commission Renewable Action Team website as requesting ARRA funding. Additional renewable projects proposed on private and State lands but not requesting ARRA funds are listed on the website.

**TABLE 4.1-4**
**EXISTING PROJECTS ALONG THE I-10 CORRIDOR (Eastern Riverside County)**

| ID #* | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| 1 | Interstate 10 | Linear project running from Santa Monica to Blythe (in California) | Caltrans | Existing | N/A | Interstate 10 (I-10) is a major east-west route for trucks delivering goods to and from California. It is a four lane divided highway in the Blythe region. |
| 2 | Chuckwalla Valley State Prison | 19025 Wiley's Well Rd. Blythe, CA | CA Dept. of Corrections & Rehabilitation | Existing | 1,080 | State prison providing long-term housing and services for male felons classified as medium and low-medium custody inmates jointly located on 1,720 acres of State-owned property. APN 879040006,008, 012, 027, 028, 029, 030, |
| 3 | Ironwood State Prison | 19005 Wiley's Well Rd. Blythe, CA | CA Dept. of Corrections & Rehabilitation | Existing | 640 | ISP jointly occupies with Chuckwalla Valley State Prison 1,720 acres of State-owned property, of which ISP encompasses 640 acres. The prison complex occupies approximately 350 acres with the remaining acreage used for erosion control, drainage ditches, and catch basins. 879040001, 004, 009, 010, 011, 015, 016, 017, 018, 019, 020 |
| 4 | Devers-Palo Verde Transmission Line | From the Midpoint Substation to Devers Substation | SCE | Existing | N/A | Existing 500 kV transmission line parallel to I-10 from Midpoint Substation, approximately 10 miles southwest of Blythe, to the SCE Devers Substation, near Palm Springs. |
| 5 | Blythe Energy Project | City of Blythe, north of I-10, 7 miles west of the CA/AZ border | Blythe Energy, LLC | Existing | 76 | 520 MW combined-cycle natural gas-fired electric-generating facility. Project is connected to the Buck Substation owned by WAPA. |
| 6 | West-wide Section 368 Energy Corridors | Riverside County, parallel to DPV corridor | BLM, DOE, U.S. Forest Service | Approved by BLM and U.S. Forest Service | N/A | Designation of corridors on federal land in the 11 western states, including California, for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities (energy corridors). One of the corridors runs along the southern portion of Riverside County. |
| 7 | Eagle Mountain Pumping Plant | Eagle Mountain Road, west of Desert Center | Metropolitan Water District of Southern California | Existing | | 144 ft. pumping plant that is part of the Metropolitan Water District of Southern California's facilities. APNs 807150007, 807150009, 807150010 |

**TABLE 4.1-4 (Continued)**
**EXISTING PROJECTS ALONG THE I-10 CORRIDOR (Eastern Riverside County)**

| ID #* | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| 8 | Recreational Opportunities | Eastern Riverside County | BLM | Existing | N/A | BLM has numerous recreational opportunities on lands in eastern Riverside County along the I-10 corridor including the Wiley's Well Campground, Coon Hollow Campground, and multiple Long-Term Visitor Areas. See FEIS Chapter 3.13. |
| 9 | Kaiser Mine | Eagle Mountain, north of Desert Center | Kaiser Ventures, Inc. | Mining activities stopped in 1983. | | Kaiser Steel mined iron ore at Kaiser Mine in Eagle Mountain and provided much of the Pacific Coast steel in the 1950s. Mining project also included the Eagle Mountain Railroad, 51 miles long. Imported steel captured market share in the 1960s and 1970s and primary steelmaking closed in the 1980s. 701380031 |

* ID # correlates with location on Figure 2-5.
SOURCE: CEC RSA June 2010 Section B.3.4, Table 2.

Other future foreseeable projects along the I-10 corridor in Eastern Riverside County are identified in Table 4.1-5.

## 4.1.5 Mitigation Measures Included in the Analysis

For impacts identified in the following resource sections, mitigation measures have been developed that would be implemented during all appropriate phases of the project from initial ground breaking, to operations, and through closure and decommissioning. The mitigation measures include a combination of the following:

1. Measures that have been proposed by the applicant;
2. Conditions of Certification (COCs) proposed by the California Energy Commission;
3. Regulatory requirements of other federal, state, and local agencies;
4. USFWS terms and conditions identified in the Biological Opinion; and
5. Additional BLM-proposed mitigation measures, standard right-of-way (ROW) grant terms and conditions, and best management practices.

**TABLE 4.1-5**
**FUTURE FORESEEABLE PROJECTS ALONG THE I-10 CORRIDOR (Eastern Riverside County)**

| ID #* | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| A | Four Commercial Projects | Blythe, CA | Various | Approved | N/A | Four commercial projects have been approved by the Blythe Planning Department including the Agate Road Boat & RV Storage, Riverway Ranch Specific Plan, Subway Restaurant and Motel, and Agate Senior Housing Development. |
| B | Intake Shell | Blythe, CA | | Under Construction | N/A | Reconstruction of a Shell facility located at Intake & Hobsonway. Demolition occurred in 2008, reconstruction planned for 2009-2010. |
| C | Fifteen Residential Developments | Blythe, CA | Various | Approved/ Under Construction | N/A | Twelve residential development projects have been approved by the Blythe Planning Department including: Vista Palo Verde (83 Single Family Residential [SFR]), Van Weelden (184 SFR), Sonora South (43 SFR), Ranchette Estates (20 SFR), Irvine Assets (107 SFR), Chanslor Village (79 SFR), St. Joseph's Investments (69 SFR), Edgewater Lane (SFR), The Chanslor Place Phase IV (57 SFR), Cottonwood Meadows (103 Attached SFR), Palo Verde Oasis Phase IV (29 SFR).<br>Three residential development projects have been approved and are under construction including: The Chanslor Phase II & III (78 SFR), River Estate at Hidden Beaches, Mesa Bluffs Villas (26 Attached SFR). |
| D | Devers-Palo Verde 2 Transmission Line Project | From the Midpoint Substation to Devers Substation | SCE | Project was approved by CPUC 11/2009. | N/A | New 500 kV transmission line parallel to the existing Devers-Palo Verde Transmission Line from Midpoint Substation, approximately 10 miles southwest of Blythe, to the SCE Devers Substation, near Palm Springs. The ROW for the 500 kV transmission line would be adjacent to the existing DPV ROW and would require an additional 130 feet of ROW on federal and State land and at least 130 feet of ROW on private land and Indian Reservation land. |
| E | Colorado Substation | 10 miles southwest of Blythe | SCE | Project was approved by CPUC 11/2009. | 44 | The new 500/230 kV substation would be constructed within a rectangular area approximately 1,000 feet by 1,900 feet, resulting in approximately 44 acres permanently disturbed. The 500 kV switching station would include buses, circuit breakers, and disconnect switches. The switchyard would be equipped with 108-foot-high dead-end structures. Outdoor night lighting would be designed to illuminate the switchrack when manually switched on. |
| F | Blythe Energy Project Transmission Line | From the Blythe Energy Project (Blythe, CA) to Devers Substation | Blythe Energy, LLC | Under construction | N/A | Transmission Line Modifications including upgrades to Buck Substation, approximately 67.4 miles of new 230 kV transmission line between Buck Substation and Julian Hinds Substation, upgrades to the Julian Hinds Substation, installation of 6.7 miles of new 230 kV transmission line between Buck Substation and SCE's DPV 500 kV transmission line. |
| G | Desert Southwest Transmission Line | 118 miles primarily parallel to DPV | Imperial Irrigation District | Final EIR prepared 2005. Approved by the BLM in 2006. | N/A | New, approximately 118-mile 500 kV transmission line from a new substation/switching station near the Blythe Energy Project to the existing Devers Substation located approximately 10 miles north of Palm Springs, California. |

**TABLE 4.1-5 (Continued)**
**FUTURE FORESEEABLE PROJECTS ALONG THE I-10 CORRIDOR (Eastern Riverside County)**

| ID #* | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| H | Green Energy Express Transmission Line Project | 70-mile transmission line from the Eagle Mountain Substation to southern California | Green Energy Express LLC | September 9, 2009, Green Energy Express LLC filed a Petition for Declaratory Order requesting that FERC approve certain rate incentives for the project | N/A | 70-mile double-circuit 500 kV transmission line and new 500/230 kV substation from near the Eagle Mountain Substation (eastern Riverside County) to Southern California |
| I | Blythe Energy Project II | Blythe, CA. Near the Blythe Airport and I-10 | Blythe Energy, LLC | Approved December 2005 | 30 acres (located on Blythe Energy Project land) | 520 MW combined-cycle power plant located entirely within the Blythe Energy Project site boundary. Blythe Energy Project II will interconnect with the Buck Substation constructed by WAPA as part of the Blythe Energy Project. Project is designed on 30 acres of a 76-acre site. |
| J | Eagle Mountain Pumped Storage Project | Eagle Mountain iron ore mine, north of Desert Center | Eagle Crest Energy Company | License application filed with FERC in June 2009 | 1,524 | 1,300 MW pumped storage project designed to store off-peak energy to utilize during on-peak hours. The captured off-peak energy will be used to pump water to an upper reservoir where the energy will be stored. The water will then be released to a lower reservoir through an underground electrical generating facility where the stored energy will be released back into the Southwestern grid during “high demand peak” times, primarily weekdays. Estimated water use is 8,100 AFY for the first four-year start-up period and replacement water is 1,763 AFY thereafter. 1 |
| K | Palen Solar Power Project | North of I-10, 10 miles east of Desert Center | Solar Millennium LLC/Chevron Energy | Undergoing environmental review, construction to begin end of 2010 with one unit online in 2012 and one unit online in 2013. | 5,200 | 500 MW solar trough project on 5,200 acres. Facility would consist of two 250 MW plants. Approximately 3,870 acres would be disturbed. Project would include interconnection to the SCE Red Bluff Substation. Project would use 300 AFY. |
| L | Blythe Solar Power Project | North of I-10, 8 miles west of Blythe | Palo Verde Solar I, LLC | Undergoing environmental review; construction to begin end of 2010. | 7,025 | A concentrated solar thermal electric generating facility with four adjacent, identical units of 250 megawatt (MW) nominal capacity each for a total nominal capacity of 1,000 MW. |
| M | NextEra (FPL) McCoy | Northwest of Blythe, CA, immediately north of Blythe Solar Power Project | NextEra (FPL) | Plan of Development in to Palm Springs BLM | 7,771 | 250 MW solar trough project. ROW in process for monitoring water well drilling. |

**TABLE 4.1-5 (Continued)**
**FUTURE FORESEEABLE PROJECTS ALONG THE I-10 CORRIDOR (Eastern Riverside County)**

| ID #* | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| N | McCoy Soleil Project | 10 miles northwest of Blythe | enXco | Application withdrawn | 1,959 | 300 MW solar power tower project located on 1,959 acres. Project would require a 14 mile transmission line to proposed SCE Colorado Substation south of I-10. Would use 575-600 AFY. |
| P | Big Maria Vista Solar Project | North of I-10, approximately 12 miles northwest of Blythe | Bullfrog Green Energy | Plan of Development submitted to BLM | 22,717 | 500 MW solar photovoltaic project on 22,717 acres of land. Project would be built in three phases and would require 6,000 gallons of water monthly. |
| Q | Chuckwalla Solar I | 1 mile north of Desert Center | Chuckwalla Solar I, LLC | Plan of Development submitted to BLM | 4,083 | 200 MW solar photovoltaic project on 4,083 acres of land. Project would be developed in several phases and would tap into an existing SCE 161-kV transmission line crossing the site. |
| R | Rice Solar Energy Project | Rice Valley, Eastern Riverside County | Rice Solar Energy, LLC (SolarReserve, LLC) | Undergoing environmental review. Construction to begin in 2011 | 1,410 | 150 MW solar power tower project with liquid salt storage. Project is located on approximately 1,410 acres and includes a power tower approximately 650 feet tall and a 10-mile long interconnection with the WAPA Parker-Blythe transmission line. |
| S | Blythe Airport Solar I Project | Blythe Airport | U.S. Solar | Application has been submitted to City of Blythe, City of Blythe approved the project in November, 2009 | 640 | 100 MW solar photovoltaic project located on 640 acres of Blythe airport land. |
| T | Blythe PV Project | Blythe | First Solar | CPUC approved project terms of a 20 year power purchase agreement for sale of 7.5 MW, Under construction in fourth quarter, 2009 | 200 | 7.5 MW solar photovoltaic project located on 200 acres. Project was constructed by First Solar and sold to NRG Energy. |
| U | Desert Quartzite | South of I-10, 8 miles southwest of Blythe | First Solar (previously OptiSolar) | POD in to BLM | 7,724 | 600 MW solar photovoltaic project located on 7,724 acres. Adjacent to DPV transmission line and SCE Colorado Substation. Approximately 27 AF would be used during construction and 3.8 AFY during operation. |
| V | Desert Sunlight | North of Desert Center | First Solar (previously OptiSolar) | POD in to BLM | 5,000-6,000 | 250 MW solar photovoltaic project located on 5,000-6,000 acres. Project would tie into the SCE Red Bluff Substation. Approximately 27 AF would be used during construction and 3.8 AFY during operation. |
| W | Mule Mountain Soleil Project | North of Wileys Well Road, east of Genesis Solar Energy Project | enXco | POD in to BLM | 2,058 | 200 MW solar photovoltaic project location on 2,058 acres. |
| X | Eagle Mountain Soleil Project | 6 miles north of Desert Center | enXco | | 1,057 | 100 MW photovoltaic plant on 1,057 acres of BLM land. Would require a 5-8 mile transmission line to planned SCE Red Bluff Substation. |

**TABLE 4.1-5 (Continued)**
**FUTURE FORESEEABLE PROJECTS ALONG THE I-10 CORRIDOR (Eastern Riverside County)**

| ID #* | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| Y | Red Bluff Substation | Unknown at this time – near Desert Center | SCE | | N/A | Proposed 230/500 kV Substation near Desert Center. Planned to interconnect renewable projects near Desert Center with the DPV transmission line. |
| Z | Chuckwalla Valley Raceway | Desert Center Airport (no longer a functioning airport) | Developer Matt Johnson | Under construction, track expected to be open in mid 2010 | 400 | Proposed 500-mile race track located on 400 acres of land that used to belong to Riverside County and was used as the Desert Center airport. APN 811142016, 811142006 |
| AA | Eagle Mountain Landfill Project | Eagle Mountain, North of Desert Center | Mine<br>Reclamation Corporation and Kaiser Eagle Mountain, Inc. | U.S. Court of Appeals for the Ninth Circuit issued its regarding the EIS for the project in 11/09 and ruled that the land exchange for the project was not properly approved by the administrative agency. Kaiser's Mine and Reclamation is considering all available options. | ~ 3,500 | The project proposed to develop the project on a portion of the Kaiser Eagle Mountain Mine in Riverside County, California. The proposed project comprises a Class III nonhazardous municipal solid waste landfill and the renovation and repopulation of Eagle Mountain Townsite. The proposal by the proponent includes a land exchange and application for rights-of-way with the Bureau of Land Management and a Specific Plan, General Plan Amendment, Change of Zone, Development Agreement, Revised Permit to Reclamation Plan, and Tentative Tract Map with the County. The Eagle Mountain landfill project is proposed to accept up to 20,000 tons of non-hazardous solid waste per day for 50 years. |
| AB | Wileys Well Communication Tower (part of the Public Safety Enterprise Communication System) | East of Wileys Well Road, just south of I-10 | Riverside County | Final EIR for the Public Safety Enterprise Communication System published in August 2008. | N/A | The Public Safety Enterprise Communication project is the expansion of the County of Riverside's fire and law enforcement agencies approximately 20 communication sites to provide voice and data transmission capabilities to assigned personnel in the field. |
| AC | Mule Mountain Solar Project | South of I-10, approximately 4 miles west of Blythe | Bullfrog Green Energy | Plan of Development in to Palm Springs BLM | 6,634 | 500 MW solar concentrating photovoltaic project located on 6,634 acres. Considering interconnection with proposed SCE Colorado Substation. Approximately 6,000 gallons of water would be required monthly. |
| See "E" | Colorado River Substation Expansion Project | Riverside County, near Blythe | Southern California Edison | | 45 | Expand existing 500 kV switchyard, previously approved as part of the DPV2 CPCN on approximately 45 acres of land, into a full 500/220 kV substation on approximately 90 acres of land. |

**TABLE 4.1-5 (Continued)**
**FUTURE FORESEEABLE PROJECTS ALONG THE I-10 CORRIDOR (Eastern Riverside County)**

| ID #* | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| Additional Projects Outside Cumulative Figure Boundaries | | | | | | |
| | Paradise Valley "New Town" Development | Approximately 30 miles west of Desert Center (7 miles east of the city of Coachella) | Glorious Land Company | Notice of Preparation of an EIR published in December of 2005. Still under environmental review. | 6,397 | Company proposed to develop a planned community as an international resort destination with residential, recreational, commercial, and institutional uses and facilities. The project is planned as a self-contained community with all public and quasi-public services provided. The project is located outside the Coachella Valley Water District (CVWD) boundaries and the applicant has entered into an agreement with the CVWD to manage artificial recharge of the Shaver's Valley groundwater. The proponent has purchased a firm water supply from Rosedale-Rio Bravo Water District in Kern County. In-kind water will be transferred to the MWD which will release water from the Colorado River Aqueduct to a 38 acre percolation pond on the project site. The MWD will deliver approximately 10,000 AFY to the percolation pond and over the long term, no net loss of groundwater in storage is anticipated. |
| | Proposed National Monument (former Catellus Lands) | Between Joshua Tree National Park and Mojave National Preserve | | In December 2009, Senator Feinstein introduced bill S.2921 that would designate two new national monuments including the Mojave Trails National Monument. | 941,000 acres | The proposed Mojave Trails National Monument would protect approximately 941,000 acres of federal land, including approximately 266,000 acres of the former railroad lands along historic Route 66. The BLM would be given the authority to conserve the monument lands and also to maintain existing recreational uses, including hunting, vehicular travel on open roads and trails, camping, horseback riding and rockhounding. |
| | BLM Renewable Energy Study Areas | Along the I-10 corridor between Desert Center and Blythe | BLM | Proposed | | The DOE and BLM identified 24 tracts of land as Solar Energy Study Areas in the BLM and DOE Solar PEIS. These areas have been identified for in-depth study of solar development and may be found appropriate for designation as solar energy zones in the future. |
| | Solar Energy projects along Arizona Border | Approximately 15 miles east of the CA/ AZ border along I-10 corridor | Various | Applications filed in to Arizona BLM field offices, application status listed as pending. | | Five solar trough and solar power tower projects have been proposed along the I-10 corridor approximately 15 miles east of the CA/AZ border. The projects have been proposed on BLM administered-land in the Yuma and Kingman Field Offices and have requested use of approximately 75,000 acres. |

* ID # correlates with location on Figure 2-5.

1 Water usage for the Eagle Mountain Pumped Storage Project was based on the information provided to FERC by the Eagle Crest Energy Company in the Responses to Deficiency of License Application and Additional Information Request dated October 26, 2009.

SOURCE: CEC, RSA (June 2010) Section B.3.4, Table 3.

These requirements are generically referred to as "Mitigation Measures" throughout this FEIS. Because these Mitigation Measures are derived from a variety of sources, they also are required, and their implementation regulated, by the various agencies.

Many of the other mitigation measures are required by agencies other than the BLM and their implementation will be enforced by those other agencies against the Applicant. The Applicant will be required by the Record of Decision (ROD) and the ROW grant to comply with the requirements of those other agencies (see, e.g., 43 CFR 2805.12(a) (Federal and state laws and regulations). In addition, the Applicant will be required by 43 CFR 2805.12(i)(6) to comply with project-specific terms calling for compliance with state standards (when they are more stringent than Federal) for public health and safety, environmental protection and siting, constructing, operating, and maintaining any facilities and improvements on the ROW).

As noted above, the BLM recognizes that the Energy Commission COCs are not generally within the enforcement authority of the BLM since the CEC COCs are requirements originating in State law and regulation. While the Applicant must comply with these measures, they are not directly enforceable by the BLM. For those COCs that are also within the enforcement authority of the BLM because of overlapping authorities, the BLM incorporates those COCs into its ROW grant as its own terms and conditions subject to its enforcement authority. Appendix G contains a list of COCs and denotes those measures that will be monitored and managed by the CEC, and those that will be subject to joint administration between the BLM and CEC.

In some instances, the BLM identified potential impacts to public land resources that would not be and have not been addressed by mitigation measures required by these other agencies. In these instances, individual mitigation measures have been developed by the BLM for incorporation into any ROW grant that may issue, and will be monitored and managed solely by the BLM. In addition, standard terms and conditions for approval of the use of public land will be set forth in any ROD and incorporated into any ROW grant and therefore will be enforced by the BLM as part of any ROW grant approved for the project.

### 4.1.6 Terms and Conditions found in FLPMA and BLM ROW Regulations

Title V of the Federal Land Policy and Management Act of 1976 addresses the issuance of ROW authorizations on public land. The BLM has identified all the lands that will be occupied by facilities associated with the GSEP that are needed for its construction, operation, and maintenance. The general terms and conditions for all public land rights of way are described in FLPMA section 505, and include measures to minimize damage to scenic and esthetic values and fish and wildlife habitat and otherwise protect the environment, require compliance with air and water quality standards pursuant to Federal or State law; and require compliance with any state standards (where more stringent than the Federal ) for public health and safety, environmental protection, siting, construction, operation, and maintenance of ROWs. The Secretary may prescribe additional terms and conditions as s/he deems necessary to protect Federal property, provide for efficient management, and among other things, generally protect the public interest in the public lands subject to the right-of-way or lands adjacent thereto. For this project, terms and

conditions have been developed for incorporation into any ROW that may issue that are necessary to protect public safety, including security fencing and on-site personnel. The environmental consequences analysis in this FEIS identifies impacts and mitigation measures to reduce/eliminate impacts. The mitigation measures identified by the BLM and incorporated as a term and condition of the ROW grant provide those actions necessary to prevent unnecessary or undue degradation of the public lands as required by FLPMA section 302. The additional mitigation measures that are identified and described in this FEIS and that will be enforced by the other agencies, as noted above, provide additional protection to public land resources.

Specifically, this PA/FEIS identifies recommended mitigation measures that would:

1. Require compliance with Mojave Desert Air Quality Management District State regulations, reduce carbon emissions, and minimize dust;

2. Require planning and compliance with Federal, State and local agency requirements for Drainage, Erosion and Sediment Control, wastewater management, groundwater use and monitoring, and stormwater control and monitoring;

3. Require measures to protect public health and safety including traffic control, transmission line standards, and worker safety plans; and

4. Require biological resource mitigation and cultural resources mitigation to protect sensitive environmental resources and cause the least damage to the environment and protect the public interest, while allowing the project to be constructed.

Finally, all BLM ROW grants are approved subject to regulations contained at 43 CFR 2800. Those regulations specify that the BLM may, at any time, change the terms and conditions of a ROW grant "as a result of changes in legislation, regulations, or as otherwise necessary to protect public health or safety or the environment." 43 CFR 2805.15(e).

The BLM will monitor conditions and review any ROW grant issued for the GSEP to evaluate if future changes to the grant terms and conditions are necessary or justified under this provision of the regulations to further minimize or reduce impacts resulting from the project.

If approved, the solar energy ROW authorization will include diligent development terms and conditions, consistent with the requirements of 43 CFR 2805.12(i)(5). Failure of the holder to comply with the diligent development terms and conditions provides the BLM authorized officer the authority to suspend or terminate the authorization (43 CFR 2807.17).

If approved, the solar energy ROW authorization will include a required "Performance and Reclamation" bond to ensure compliance with the terms and conditions of the ROW authorization, consistent with the requirements of 43 CFR 2805.12(g). The "Performance and Reclamation" bond will consist of three components. The first component will address hazardous materials, the second component the decommissioning and removal of improvements and facilities and the third component reclamation, revegetation, restoration and soil stabilization.

# 4.2 Impacts on Air Resources

## 4.2.1 Impact Assessment Methodology

### Dispersion Modeling Assessment

The Applicant used the U.S. Environmental Protection Agency guideline American Meteorological Society/EPA Regulatory Model (AERMOD) to estimate ambient impacts from GSEP construction and operation. The construction emission sources for the site were grouped into two categories: equipment (off-road equipment); and vehicles (on-road equipment), where the exhaust and fugitive dust emissions for each type were calculated for particulate matter modeling. Emissions from onsite equipment engines and fugitive dust emission sources were modeled as area sources. Similar modeling procedures were used by the applicant to determine impacts from the operating maintenance vehicle exhaust and fugitive dust emissions, while the stationary sources (boilers, engines, cooling towers) were modeled as point sources.

This air dispersion model provides a means of predicting the location and ground level magnitude of the impacts of a new emissions source. These models consist of several complex series of mathematical equations, which are repeatedly calculated by a computer for many ambient conditions to provide theoretical maximum offsite pollutant concentrations for short-term (one-hour, three-hour, eight-hour, and 24-hour) and annual periods. The model results are generally described as maximum concentrations, often described as a unit of mass per volume of air, such as micrograms per cubic meter ($\mu g/m^3$).

The inputs for the air dispersion models include two power blocks with stack information (exhaust flow rate, temperature, and stack dimensions); specific engine and vehicle emission data; and meteorological data, such as wind speed, atmospheric conditions, and site elevation. For the proposed GSEP, the meteorological data used as inputs to the model included hourly wind speeds and directions measured at the Blythe Airport meteorological station during 2002 through 2004.

For the determination of one-hour average and annual average construction NOx concentrations the Ozone Limiting Method (OLM) was used to determine worst-case near field $NO_2$ impacts. The NOx emissions from internal combustion sources, such as diesel engines, are primarily in the form of nitric oxide (NO) rather than $NO_2$. The NO converts into $NO_2$ in the atmosphere, primarily through the reaction with ambient ozone, and NOx OLM assumes full conversion of stack NO emission with the available ambient ozone. The NOx OLM method was used assuming an initial $NO_2$/NOx ratio of 0.1 for all NOx emission sources. Actual monitored hourly background ozone concentration data from Niland, California were used for all of 2002 and January through April of 2003, and Blythe monitoring data were used from May 2003 through 2004, based on data availability, to provide ozone data that corresponds with the years of meteorological data that were used to calculate maximum potential NO to $NO_2$ conversion to determine the maximum hourly $NO_2$ impacts.

Background concentrations provided by the Applicant were replaced where appropriate[1] with the available highest ambient background concentrations from the last three years at the most representative monitoring stations as shown in Table 4.2-1. The information presented in Table 4.2-1 has been updated since the publication of the DEIS to use peak values from 2007 to 2009 background data for gaseous pollutants (2009 data was not yet available); the updated information shows an improvement in worst-case background concentrations for many of the criteria pollutants included in the air dispersion modeling analysis. Modeled impacts to these background concentrations were added, and then compared with the ambient air quality standards for each respective air contaminant to determine whether the proposed GSEP's emission impacts would cause a new exceedance of an ambient air quality standard or would contribute to an existing exceedance.

**TABLE 4.2-1**
**BACKGROUND CONCENTRATIONS (µG/M$^3$)**

| Pollutant | Averaging Time | Recommended Background | Limiting AAQS[b] | Percent of Standard |
|---|---|---|---|---|
| $NO_2$ | 1 hour | 119 | 339 | 35% |
| | Annual | 19 | 57 | 33% |
| CO | 1 hour | 2,645 | 23,000 | 12% |
| | 8 hour | 878 | 10,000 | 9% |
| PM10 | 24 hour | 83 | 50 | 166% |
| | Annual | 30.5 | 20 | 153% |
| PM2.5 | 24 hour[a] | 20.5 | 35 | 59% |
| | Annual | 8.7 | 12 | 73% |
| $SO_2$ | 1 hour | 23.6 | 195 | 12% |
| | 3 hour | 15.6 | 1,300 | 1% |
| | 24 hour | 13.1 | 105 | 12% |

NOTE:
[a] PM2.5 24-hour data shown are 98th percentile values which is the basis of the ambient air quality standard and the basis for determination of the recommended background concentration.
[b] The limiting AAQS is the most stringent of the CAAQS or NAAQS for that pollutant and averaging period.

SOURCE: CEC, RSA (June 2010) Air Quality Table 5.

## Construction Modeling Analysis

The total duration of the construction phase for Genesis Solar Electric Power (GSEP) is estimated to be approximately 37 months. Different areas within the GSEP site and the construction laydown areas would be disturbed at different times over the construction period. The total construction disturbance area would be approximately 1,800 acres, and the permanent disturbance area of the GSEP operations would be approximately 1,360 acres. The maximum acreage disturbed on any one day during construction is estimated by the applicant to be 160 acres.

[1] This does not include the background for the federal one-hour $NO_2$ standard since the Applicant's modeling analysis uses actual monitored $NO_2$ concentrations to determine the combined GSEP plus background average 98th percentile 1-hour $NO_2$ impacts.

Combustion emissions would result from the off-road construction equipment, including diesel construction equipment used for site grading, excavation, and construction of onsite structures, and water and soil binder spray trucks used to control construction dust emissions. Fuel combustion emissions also would result from exhaust from on-road construction vehicles, including heavy duty diesel trucks used to deliver materials, other diesel trucks used during construction, and worker personal vehicles and pickup trucks used to transport workers to and from and around the construction site. Fugitive dust emissions would result from site grading/excavation activities; installation of new transmission lines, water and gas pipelines; construction of power plant facilities, roads, and substations; and vehicle travel on paved/unpaved roads.

The annual emissions for the shorter duration offsite construction activities are based on the following construction durations:

1. Access Road Construction – 3 months (Months 1-3)
2. Gas Pipeline Construction – 5 months (Months 15-19)
3. Transmission Line Construction – 6 months (Months 4-9)

Using estimated peak hourly, daily and annual construction equipment exhaust emissions, the applicant modeled the proposed GSEP's air quality impacts (TTEC 2010h). To determine the construction impacts on ambient standards (i.e., 1-hour through annual), it was assumed that the emissions would occur during a daily construction schedule of 10-hour days from March through September (7am to 5pm) and 8-hour days from October through February (8am to 4pm).

The predicted proposed GSEP pollutant concentration levels were added to a conservatively estimated background of existing emission concentration levels (Table 4.2-1) to determine the cumulative effect. Table 4.2-2 presents the results of the Applicant's modeling analysis. The construction-related maximum daily emissions modeling analysis for the GSEP, including both the onsite fugitive dust and vehicle tailpipe emission sources, is summarized in Table 4.2-3, and maximum annual emissions are summarized in Table 4.2-4.

## Operation Modeling Analysis

Using estimated peak hourly, daily and annual operating emissions, the applicant modeled the proposed GSEP's operation emissions to determine impacts (TTEC 2010h). The predicted proposed GSEP pollutant concentration levels were added to conservatively estimated worst-case maximum background concentration levels (Table 4.2-1) to determine the cumulative effect. Table 4.2-5 presents the results of the Applicant's modeling analysis of operations-phase emissions. This analysis includes emissions from the stationary sources for all four power blocks and the onsite fugitive dust and vehicle tailpipe emission sources estimated by the Applicant. Table 4.2-6 presents operation-related maximum daily emissions modeling analysis for the GSEP. Table 4.2-7 presents operation-related maximum annual emissions modeling analysis for the GSEP. The following are the stationary and mobile emission source operating assumptions that were used to develop the operation emissions estimates for the GSEP:

**TABLE 4.2-2**
**MAXIMUM GSEP CONSTRUCTION IMPACTS**

| Pollutants | Avg. Period | Project Impact[a] ($\mu g/m^3$) | Background ($\mu g/m^3$) | Total Impact ($\mu g/m^3$) | Standard ($\mu g/m^3$) | Percent of Standard |
|---|---|---|---|---|---|---|
| $NO_2$ | 1-hr. | 84.1 | 119 | 203.1 | 339 | 60% |
| | Annual | 0.34 | 19.0 | 19.3 | 57 | 34% |
| CO | 1-hr | 41.6 | 2,645 | 2,687 | 23,000 | 12% |
| | 8-hr | 10.8 | 878 | 889 | 10,000 | 9% |
| PM10 | 24-hr | 45.0 | 83 | 128 | 50 | 256% |
| | Annual | 0.47 | 30.5 | 31.0 | 20 | 155% |
| PM2.5 | 24-hr | 9.5 | 20.5 | 30.0 | 35 | 86% |
| | Annual | 0.11 | 8.7 | 8.8 | 12 | 73% |
| $SO_2$ | 1-hr | 0.09 | 23.6 | 23.7 | 195 | 12.2% |
| | 3-hr | 0.06 | 15.6 | 15.7 | 1,300 | 1% |
| | 24-hr | 0.02 | 13.1 | 13.1 | 105 | 12% |

NOTE: Modeled 1-hour $NO_2$ concentrations were determined using the OLM method with time-matched ambient $NO_2$background.

[a] These results do not include the fugitive dust emission revision performed by the applicant in the revised data responses.

SOURCE: CEC, RSA (June 2010) Air Quality Table 10

**TABLE 4.2-3**
**GSEP CONSTRUCTION – MAXIMUM DAILY EMISSIONS (lbs/day)**

| | NOx | SOx | CO | VOC | PM10 | PM2.5 |
|---|---|---|---|---|---|---|
| Onsite Construction Emissions | | | | | | |
| Onsite Combustion Emissions | 445.8 | 0.5 | 220.3 | 71.2 | 25.4 | 25.1 |
| Onsite Fugitive Dust Emissions | -- | -- | -- | -- | 48.5 | 10.2 |
| ***Subtotal of Onsite Emissions*** | ***445.8*** | ***0.5*** | ***220.3*** | ***71.2*** | ***73.9*** | ***35.3*** |
| Offsite Emissions | | | | | | |
| Access Road Equipment Exhaust | 97.3 | 0.1 | 48.5 | 14.4 | 6.5 | 6.5 |
| Gas Line Equipment Exhaust | 110.9 | 0.1 | 63.9 | 18.8 | 6.8 | 6.7 |
| Transmission Line Equipment Exhaust | 73.7 | 0.1 | 38.6 | 11.7 | 4.3 | 4.3 |
| Delivery Hauling Exhaust | 74.97 | 0.094 | 26.4 | 5.72 | 3.41 | 3.42 |
| Worker Travel Exhaust | 71.8 | 0.65 | 716.5 | 59.5 | 5.82 | 5.81 |
| Access Road Fugitive Dust | -- | -- | -- | -- | 0.9 | 0.2 |
| Gas Line Fugitive Dust | -- | -- | -- | -- | 1.2 | 0.2 |
| Transmission Line Fugitive Dust | -- | -- | -- | -- | 1.2 | 0.2 |
| Paved Road Fugitive Dust | -- | -- | -- | -- | 10.2 | 1.7 |
| Unpaved Road Fugitive Dust | -- | -- | -- | -- | 197.1 | 19.6 |
| Track Out Fugitive Dust | -- | -- | -- | -- | 4.2 | 0.7 |

NOTE: Emissions that were not added may not be additive due to occurring at different times during the construction schedule.

SOURCE: CEC, RSA (June 2010) Air Quality Table 6.

**TABLE 4.2-4**
**GSEP CONSTRUCTION – TOTAL CONSTRUCTION PERIOD EMISSIONS (tons)**

| | NOx | SOx | CO | VOC | PM10 | PM2.5 |
|---|---|---|---|---|---|---|
| Onsite Construction Emissions | | | | | | |
| Onsite Combustion Emissions | 109.7 | 0.12 | 54.2 | 17.5 | 6.24 | 6.19 |
| Onsite Fugitive Dust Emissions | -- | -- | -- | -- | 18.6 | 3.9 |
| ***Subtotal of Onsite Emissions*** | ***109.7*** | ***0.12*** | ***54.2*** | ***17.5*** | ***24.84*** | ***10.09*** |
| Offsite Emissions | | | | | | |
| Access Road Equipment Exhaust | 2.5 | 0.003 | 1.3 | 0.4 | 0.17 | 0.17 |
| Gas Line Equipment Exhaust | 5.8 | 0.007 | 3.3 | 1.0 | 0.36 | 0.35 |
| Transmission Line Equipment Exhaust | 4.5 | 0.005 | 2.4 | 0.7 | 0.27 | 0.27 |
| Delivery Hauling Exhaust | 30.5 | 0.037 | 10.74 | 2.33 | 1.39 | 1.39 |
| Worker Travel Exhaust | 29.2 | 0.3 | 291.6 | 24.2 | 2.4 | 2.4 |
| Access Road Fugitive Dust | -- | -- | -- | -- | 0.031 | 0.01 |
| Gas Line Fugitive Dust | -- | -- | -- | -- | 0.06 | 0.01 |
| Transmission Line Fugitive Dust | -- | -- | -- | -- | 0.07 | 0.02 |
| Paved Road Fugitive Dust | -- | -- | -- | -- | 3.82 | 0.65 |
| Unpaved Road Fugitive Dust | -- | -- | -- | -- | 6.5 | 0.65 |
| Track Out Fugitive Dust | -- | -- | -- | -- | 1.58 | 0.27 |
| ***Subtotal of Offsite Emissions*** | ***72.5*** | ***0.352*** | ***309.34*** | ***28.63*** | ***16.65*** | ***6.19*** |
| **Total Emissions** | **182.2** | **0.472** | **363.54** | **46.13** | **41.49** | **16.28** |

SOURCE: CEC, RSA (June 2010) Air Quality Table 7.

**TABLE 4.2-5**
**GSEP OPERATION EMISSION IMPACTS**

| Pollutants | Avg. Period | Project Impact[a] ($\mu g/m^3$) | Background ($\mu g/m^3$) | Total Impact ($\mu g/m^3$) | Standard ($\mu g/m^3$) | Percent of Standard |
|---|---|---|---|---|---|---|
| NO2 | 1-hr. | 189.9 | 119 | 308.9 | 339 | 91% |
| | Annual | 0.06 | 19.0 | 19.1 | 57 | 33% |
| CO | 1-hr | 12.3 | 2,645 | 2,657 | 23,000 | 12% |
| | 8-hr | 2.5 | 878 | 881 | 10,000 | 9% |
| PM10 | 24 | 15.9 | 83 | 98.8 | 50 | 198% |
| | Annual | 4.3 | 30.5 | 34.8 | 20 | 174% |
| PM2.5 | 24 | 3.4 | 20.5 | 23.9 | 35 | 68% |
| | Annual | 0.9 | 8.7 | 9.6 | 12 | 80% |
| SO2 | 1-hr | 0.184 | 23.6 | 23.8 | 195 | 12.2% |
| | 3-hr | 0.102 | 15.6 | 15.7 | 1,300 | 1% |
| | 24-hr | 0.008 | 13.1 | 13.1 | 105 | 12% |

[a] These results do not include the fugitive dust emission revision performed by the applicant after the data

SOURCE: CEC, RSA (June 2010) Air Quality Table 11.

**TABLE 4.2-6**
**GSEP OPERATIONS – MAXIMUM DAILY EMISSIONS (lbs/day)**

| | NOx | SOx | CO | VOC | PM10 | PM2.5 |
|---|---|---|---|---|---|---|
| Onsite Operation Emissions | | | | | | |
| HTF Auxiliary Heaters | 9.25 | 0.224 | 15.8 | 2.46 | 4.19 | 4.19 |
| Cooling Towers | -- | -- | -- | -- | 35.47 | 35.47 |
| HTF Venting/Control System | -- | -- | -- | 2.95 | -- | -- |
| HTF Components Fugitive | -- | -- | -- | 82.25 | -- | -- |
| Emergency Fire Pump Systems | 3.73 | 0.01 | 0.62 | 0.08 | 0.08 | 0.08 |
| Emergency Electrical Generators | 29.12 | 0.03 | 0.77 | 0.59 | 0.11 | 0.11 |
| Gasoline Storage Tank | -- | -- | -- | 0.38 | -- | -- |
| Onsite Operations Vehicle | 0.08 | 0.00 | 0.05 | 0.01 | 0.01 | 0.01 |
| Operations Fugitive Dust | -- | -- | -- | -- | 85.4 | 18.1 |
| ***Subtotal of Onsite Emissions*** | ***42.18*** | ***0.26*** | ***17.24*** | ***88.72*** | ***125.26*** | ***57.96*** |
| Offsite Emissions | | | | | | |
| Delivery Vehicles | 21.94 | 0.03 | 7.45 | 1.81 | 1.07 | 0.92 |
| Employee Vehicles | 3.52 | 0.05 | 35.11 | 3.69 | 0.45 | 0.29 |
| Offsite Vehicle Fugitive Dust | -- | -- | -- | -- | 8.20 | 0 |
| ***Subtotal of Offsite Emissions*** | ***25.46*** | ***0.08*** | ***42.56*** | ***5.50*** | ***9.72*** | ***1.21*** |
| **Total Maximum Daily Emissions** | **67.64** | **0.34** | **59.8** | **94.22** | **134.98** | **59.17** |

SOURCE: CEC, RSA (June 2010) Air Quality Table 8.

**TABLE 4.2-7**
**GSEP OPERATIONS – MAXIMUM ANNUAL EMISSIONS (tons/yr)**

| | NOx | SOx | CO | VOC | PM10 | PM2.5 |
|---|---|---|---|---|---|---|
| Onsite Operation Emissions | | | | | | |
| HTF Auxiliary Heaters | 0.17 | 0.00 | 0.28 | 0.04 | 0.08 | 0.08 |
| Cooling Towers | -- | -- | -- | -- | 3.78 | 3.78 |
| HTF Venting/Control System | -- | -- | -- | 0.54 | -- | -- |
| HTF Components Fugitive | -- | -- | -- | 15.01 | -- | -- |
| Emergency Fire Pump Systems | 0.10 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 |
| Emergency Electrical Generators | 0.76 | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 |
| Gasoline Storage Tank | -- | -- | -- | 0.07 | -- | -- |
| Onsite Operations Vehicle | 0.35 | 0.00 | 0.24 | 0.05 | 0.03 | 0.03 |
| Operations Fugitive Dust | -- | -- | -- | -- | 15.60 | 3.30 |
| ***Subtotal of Onsite Emissions*** | ***1.38*** | ***0.01*** | ***0.56*** | ***15.73*** | ***19.49*** | ***7.19*** |
| Offsite Emissions | | | | | | |
| Delivery Vehicles | 1.21 | 0.00 | 0.41 | 0.10 | 0.06 | 0.05 |
| Employee Vehicles | 0.64 | 0.01 | 6.41 | 0.67 | 0.08 | 0.05 |
| Offsite Vehicle Fugitive Dust | -- | -- | -- | -- | 1.31 | 0.00 |
| ***Subtotal of Offsite Emissions*** | ***1.85*** | ***0.01*** | ***6.82*** | ***0.77*** | ***1.45*** | ***0.10*** |
| **Total Maximum Daily Emissions** | **3.23** | **0.02** | **7.38** | **16.5** | **20.94** | **7.29** |

SOURCE: CEC, RSA (June 2010) Air Quality Table 9.

### *Stationary Emission Sources*

GSEP would consist of two 125 MW power plant units at the facility, each of which consists of the following equipment and emission estimate bases:

a. Auxiliary boiler: 30.0 MMbtu/hr, fired on natural gas. Emissions estimate is based on 14 hr/day, and 1,000 hr/year of full load operation each.

b. Cooling tower: seven cell wet cooling tower unit that provides steam cycle and auxiliary plant cooling. Water recirculation rate of 94,623 gallons/minute, maximum recirculating water total dissolved solids content of 5,000 ppm, and mist eliminator efficiency of 0.0005 percent. Emissions are based on 15 hr/day and 3,200 hr/year of operation each.

c. HTF vent control system: Venting emission rate based on project specific HTF decomposition rate and decomposition product assumptions. A venting carbon adsorption control system would reduce emissions by 99 percent.

d. HTF piping system: 2,500 valves in service 16 hr/day, 10 pump seals in service 16 hr/day, 3,000 connectors in service 16 hr/day and 10 pressure relief valves in service 8 hr/day. SOCMI light liquid and gas (PRVs) emission factors are used[2].

e. Fire pump engine: 315 horsepower (hp) diesel-fired engine. One hour per day and 52 hours per year maximum operation.

f. Emergency generator engine: 1341 hp (1000 kW) diesel-fired engine. One hour per day and 52 hours per year maximum operation.

g. Gasoline tank: 2,000 gallon tank: Phase 1 vapor recovery, no Phase 2 vapor recovery. Tank annual 10,768 gallons. Daily emissions based on annual emissions divided by 365 days/ year.

These emission factors may not assume appropriate control efficiencies for the inspection and maintenance program required by MDAQMD. This emission estimate will be revised as determined necessary and appropriate pursuant to adaptive management principles, after further consideration of the effectiveness of the inspection and maintenance program.

### *Mobile emissions sources*

Mobile emissions sources required for operation and maintenance and employee trips are estimated based on vehicle miles traveled (VMT) and operating hours. Each mobile source has different basis for emissions estimates as provided in the applicant's revised emission estimate spreadsheets (TTEC 2010h). The GSEP onsite stationary and onsite and offsite mobile source emissions, totaled for both power units, are estimated and summarized in Air Quality Tables 4.2-5 and 4.2-6.

[2] The process of determining a consistent approach for HTF piping component emission factors with other local agencies that are currently permitting thermal solar facilities, where light liquid Synthetic Organic Chemical Manufacturing Industry (SOCMI) factors are being used to estimate VOC emissions for other projects that also use Therminol® VP-1 HTF. A revised emission estimate for this and other emission consistency issues related to the FDOC in the Air Quality Staff Assessment Addendum will be provided, if necessary.

### Construction and Operation Overlapping

Units #1 and #2 would be developed in phases with construction for Unit #2 scheduled to begin twelve months after construction of Unit #1. Each unit would take approximately twenty five months to construct before beginning commercial operation. Unit #1 would be expected to begin commercial operation in the 25th month of construction and Unit #2 would be expected to begin commercial operation after the 37th month. Construction emissions are considerably higher than operating emissions and the maximum construction emissions occur early in the overall construction process (months 2 through 13), so any overlap after the maximum construction period is assumed not to create a new maximum emissions scenario.

### Closure and Decommissioning

The anticipated lifespan of the GSEP is estimated to be 30-40 years. Closure and decommissioning-related impacts would occur from the onsite and offsite emissions that would result when the facility is dismantled and the site is restored. Such impacts would be a one-time, limited-duration event. Given expected advances in fuel efficiency and other air quality control-related advancements, it would be speculative to project the types and volumes of air emissions that would be associated with the construction and other equipment that would be necessary to decommission the GSEPP. Nonetheless, as a conservative worst-case scenario, air quality impacts associated with the ultimate decommissioning of the GSEP are evaluated using the same methods as initial construction emissions, as discussed above, and are anticipated to be comparable in type and magnitude, but likely to be lower than, construction-related emissions.

## 4.2.2 Discussion of Direct and Indirect Impacts

### Proposed Action

The modeling analysis for both the construction and operation phases indicates that, with the exception of 24-hour and annual PM10 impacts, the proposed GSEP would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. The conditions that would create worst-case project modeled impacts (low wind speeds) are not the same conditions when worst-case background is expected for PM10/PM2.5. Additionally, the worst-case PM2.5 and PM10 impacts occur at the fence line and drop off quickly with distance. Therefore, the impacts, when including mitigation measures, would not contribute substantially to exceedances of the PM10 CAAQS in the Chuckwalla Valley.

#### *Ozone*

There are air dispersion models that can be used to quantify ozone impacts, but they are used for regional planning efforts where hundreds or even thousands of sources are input into the model to determine ozone impacts. There are no regulatory agency models approved for assessing single source ozone impacts. However, because of the known relationship of NOx and VOC emissions to ozone formation, it can be said that the emissions of NOx and VOC from the GSEP do have the potential (if left unmitigated) to contribute to higher ozone levels in the region.

### *PM2.5 Impacts*

Secondary particulate formation, which is assumed to be 100 percent PM2.5, is the process of conversion from gaseous reactants to particulate products. The process of gas-to-particulate conversion, which occurs downwind from the point of emission, is complex and depends on many factors, including local humidity and the presence of air pollutants. The basic process assumes that the SOx and NOx emissions are converted into sulfuric acid and nitric acid first and then react with ambient ammonia to form sulfate and nitrate. The sulfuric acid reacts with ammonia much faster than nitric acid and converts completely and irreversibly to particulate form. Nitric acid reacts with ammonia to form both a particulate and a gas phase of ammonium nitrate. The particulate phase would tend to fall out; however, the gas phase can revert back to ammonia and nitric acid. Thus, under the right conditions, ammonium nitrate and nitric acid establish a balance of concentrations in the ambient air.

The emissions of NOx and SOx from GSEP do have the potential (if left unmitigated) to contribute to higher PM2.5 levels in the region; however, the region is in attainment with PM2.5 standards and the low level of NOx and SOx emissions from the proposed GSEP would not significantly impact that status.

### *Regional Air Quality Improvement*

The proposed GSEP would have indirect emission reductions from fossil-fuel fired power plant electrical generation. This would be due to the proposed GSEP displacing the need for their operation, since solar renewable energy facilities would operate on a must-take basis.[3] However, the exact nature and location of such reductions is not known.

## Alternatives

### *Reduced Acreage Alternative*

The short-term construction emissions and ground level pollutant concentration impacts would be similar to the proposed GSEP and would require the same level of mitigation. The total construction period and total construction emissions would be reduced from those required to construct the proposed GSEP.

The operation emissions and ground level pollutant concentration impacts would be somewhat lower than the proposed GSEP, but the same level of mitigation would be required.

The benefits of the proposed GSEP in displacing fossil fuel fired generation and reducing associated criteria pollutant emissions would be reduced.

[3] This refers to the fact that the contract between the owner of this solar power facility and the utility will require that the utility take all generation from this facility with little or no provisions for the utility to not accept generation from the facility.

### *Dry Cooling Alternative*

The magnitude of emissions from the construction of the air-cooled condenser (ACC) would be different than those from the construction of the proposed wet-cooled system. Approximately 40% more land would be disturbed for the ACCs as compared with the wet-cooling towers, and the laydown area(s) may have to be increased to store and/or prepare the air-cooled radiator components prior to installation. Grading and construction equipment would be required to prepare the site and install the ACC system. The additional soil disturbance and equipment activity would result in increased fugitive dust and vehicle exhaust emissions (as compared to the emissions shown in Tables 4.2-2 and 4.2-3). This additional construction in the context of the total construction requirements for the GSEP are relatively minor.

There would be a minor reduction in particulate (PM10 and PM2.5) emissions from the removal of the two cooling towers, as shown in Table 4.2-5. The reduction is estimated to be approximately 3.8 tons per year. The use of the ACCs would be expected to increase the auxiliary boilers' startup requirements and increase the criteria pollutant emissions from the auxiliary boilers as shown in Tables 4.2-5 and 4.2-6. The ACCs would reduce the steam power cycle's efficiency, which would reduce the total amount of facility emissions generation. The result would be a reduction in the displacement of fossil fuel fired power plant emissions from the GSEP.

The maximum short-term and maximum annual construction pollutant concentration impacts for the Dry Cooling Alternative would be slightly higher than that estimated for the proposed GSEP, assuming that the increased ACC construction requirements occur during the maximum daily and annual construction periods. Therefore, the short-term and annual construction pollutant concentration impacts for this alternative would likely be slightly higher than those shown for the proposed GSEP in Table 4.2-4.

The maximum short-term and annual operation pollutant concentration impacts for the Alternative would reduce particulate (PM10/PM2.5) emissions. There would be a slight increase for the other criteria pollutants from those for the proposed GSEP as shown in Tables 4.2-4 and 4.2-7.

### *No Action Alternative A*

Under this alternative, the proposed GSEP would not be approved by BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the GSEP site and BLM would continue to manage the site consistent with the existing land use designations in the CDCA Land Use Plan of 1980, as amended.

The results of the No Project / No Action Alternative would be the following:

> The impacts of the proposed GSEP would not occur. However, the land on which the GSEP is proposed would remain available to other uses that are consistent with BLM's land use plan, including another potential renewable energy project.
>
> The benefits of the proposed GSEP in reducing fossil fuel use and greenhouse gas emissions from gas-fired generation would not occur.

Renewable energy projects would likely be developed on other sites in Riverside County, the Colorado Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

### *No Project Alternative B*

Under this alternative, the proposed GSEP would not be approved by BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. Because the CDCA Plan would be amended, it is possible that the site could be developed with the same or a different solar technology. Air pollutant emissions and impacts would result from the construction and operation of like solar technology and would likely be similar to the air quality impacts from the proposed GSEP.

Different solar technologies require different amounts of construction and operations maintenance; however, the benefits of the proposed GSEP in displacing fossil fuel fired generation and reducing associated pollutant emissions could occur with a different solar technology at this site. As such, this No Project Alternative could result in air quality impacts and benefits similar to the impacts under the proposed GSEP.

### *No Project Alternative C*

Under this alternative, the proposed GSEP would not be approved by BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the GSEP site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the air quality of the site is not expected to change noticeably from existing conditions and, as such, this No Project Alternative would not result in air quality impacts under the proposed GSEP nor would it result in the air quality benefits from the proposed GSEP. However, in the absence of the GSEP, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

## 4.2.3 Discussion of Cumulative Impacts

Impacts resulting from construction, operation, maintenance and decommissioning of the GSEP and its alternatives could result in a cumulative effect on air quality with other past, present, or reasonably foreseeable future actions. The geographic scope of the cumulative effects analysis for air quality consists of the Mojave Desert Air Basin, which is comprised of four air districts: the Kern County APCD (governing the eastern portion of Kern County), the Antelope Valley AQMD (governing the northeastern portion of Los Angeles County), the Mojave Desert AQMD (San Bernardino County and eastern-most Riverside County), and the eastern portion of the South Coast AQMD (eastern Riverside County). This geographic scope of cumulative impacts analysis was established based on the natural boundaries of the affected resource, and not on jurisdictional

boundaries. Potential cumulative effects on air quality could be short-term (i.e., limited to the GSEP's proposed 39-month construction period) or long-term (i.e., occur during the projected 30-40 year lifespan of the proposed action).

Existing conditions within the cumulative impacts area reflect a combination of the natural condition and the effects of past actions, are described above, and are summarized in Table 4.2-1. Direct and indirect effects of the construction and operation of the GSEP are analyzed above; results of the GSEP-specific construction modeling analysis, including onsite fugitive dust and vehicle tailpipe emission sources, are provided in Table 4.2-2. See also Tables 4.2-3 and 4.2.4. Past, present and reasonably foreseeable future actions making up the cumulative scenario are identified in Section 4.1. Among them, projects that would be developed in eastern Kern County, northeastern Los Angeles County, San Bernardino County and eastern Riverside County could contribute to short-term or long-term pollutant concentration levels. Other utility-scale solar energy projects, such as the Blythe, Rice, Palen and Desert Sunlight solar power projects, are expected to contribute air pollutants in comparable amounts as the GSEP. Other, non-renewable energy projects are expected to contribute construction-related air pollutants, including fugitive dust and tailpipe emissions, in amounts consistent with the intensity and duration of each project's construction period, although operations-related air emissions would differ. Cumulative impacts would vary by alternative to the GSEP only to the degree to which direct and indirect impacts would vary by alternative.

## 4.2.4 Summary of Mitigation Measures

The implementation of mitigation measures imposed by the Energy Commission as Conditions of Certification for the GSEP also would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G The following mitigation measures would avoid or minimize impacts on air resources:

AQ-SC1, AQ-SC2, AQ-SC3, AQ-SC4, AQ-SC5, AQ-SC6, AQ-SC8

AQ-1, AQ-2, AQ-3, AQ-4, AQ-5, AQ-6, AQ-7, AQ-9, AQ-10, AQ-11, AQ-12, AQ-13, AQ-14, AQ-15. AQ-16, AQ-17, AQ-18, AQ-19, AQ-20, AQ-21, AQ-22, AQ-23, AQ-24, AQ-25, AQ-26, AQ-27, AQ-28, AQ-29, AQ-30, AQ-31, AQ-32, AQ-33, AQ-34, AQ-35, AQ-36, AQ-37, AQ-38, AQ-39, AQ-40

## 4.2.5 Residual Impacts after Mitigation Measures were Implemented

Residual Air Quality impacts are the emissions associated with construction and operation as outlined in Tables 4.2-4 and 4.2-5.

## 4.2.6 Unavoidable Adverse Impacts

The residual impacts described above would be unavoidable consequences of development.

# 4.3 Impacts on Global Climate Change

## 4.3.1 Impact Assessment Methodology

The methodology to assess impacts to climate change under NEPA is continuing to evolve as consensus forms as to how best to evaluate such effects on proposed action-specific and cumulative levels. The CEQ published draft guidance on February 18, 2010 for Federal agencies to improve their consideration of the effects of greenhouse gas (GHG) emissions and climate change in their evaluation of proposals for Federal actions under NEPA. For example, the CEQ proposes that agencies should consider the direct and indirect GHG emissions from the action and to quantify and disclose those emissions in the environmental document (40 CFR 1508.25). The CEQ further proposes that agencies should consider mitigation measures to reduce proposed action-related GHG emissions from all phases and elements of the proposed action and alternatives over its/their expected life, subject to reasonable limits based on feasibility and practicality.

For the GSEP and alternatives, this Section 4.3 carefully considers detailed information about the potential for construction-, operation-, maintenance- and decommissioning-related activities to emit GHGs and, thereby, contribute meaningfully to global warming in light of the combined emissions of other broad-scale causes of climate change. GHG emissions are quantified and set forth in Tables 4.3-1 and 4.3-2. Although it is doubtful that this individual project, standing alone, could result in significant climate change effects, the PA/FEIS considers the "incremental impact" of GSEP emissions as a possible contributor, together with the incremental impacts of other past, present, and reasonably foreseeable actions, to cause global climate change, which intrinsically is a cumulative issue. Mitigation measures are considered. Additionally, as discussed in Section 3.3, Global Climate Change, agencies under the U.S. Department of the Interior are required to consider potential impact areas associated with climate change, including potential changes in flood risk, water supply, sea level rise, wildlife habitat and migratory patterns, invasion of exotic species, and potential increases in wildfires.

### Analysis of Cumulative Impacts

Impacts resulting from construction, operation, maintenance and decommissioning of the GSEP and its alternatives would result in the emission of GHGs that, together with past, present, and reasonably foreseeable future actions, could contribute to climate change. GSEP-specific GHG emissions are considered in the context of this cumulative impacts analysis. Although the cumulative scenario described in Section 4.1 generally includes activities in the California desert and highlights projects along the I-10 corridor, the geographic scope of the cumulative effects analysis for climate change is much broader: it is both regional and global. Potential cumulative effects, whether adverse or beneficial, on climate change could be short-term (i.e., limited to the GSEP's proposed 39-month construction period) or long-term (i.e., occur during the projected 30-40 year lifespan of the proposed action).

Existing conditions within the cumulative impacts area reflect a combination of the natural condition and the effects of past actions. Recent years have seen record-high average global surface temperatures; in fact, the past 20 years include the 18 warmest years on record since 1850. (Pew, 2008). This warming trend could result from several factors that influence the earth's climate, including natural factors, such as changes in solar radiation and volcanic activity, and anthropogenic (or human-caused) factors, such as the release of GHGs to the atmosphere and land-cover changes. (Pew, 2008). Although climate science is complex and uncertainties remain, the evidence is compelling: human activities associated with fossil fuel burning and land use are primarily responsible for the changing (warming) global climate.

In response, the EPA issued a final rule on May 13, 2010 to apply Prevention of Significant Deterioration (PSD) requirements to new facilities whose carbon dioxide-equivalent emissions exceed 100,000 tons per year (EPA, 2010). Additionally, several states have enacted legislation establishing reduction targets for GHG emissions. For example, the California legislature adopted Assembly Bill 32, the Global Warming Solutions Act of 2006 (AB 32), which requires the California Air Resources Board to develop regulations that will reduce greenhouse gas emissions to 1990 levels by 2020 (Health and Safety Code Section 38500 et seq., 17 CCR 95100 et seq.). Moreover, State regulations prohibit utilities from entering into long-term contracts with any base load facility that does not meet a greenhouse gas emission standard of 0.5 metric tonnes carbon dioxide per megawatt-hour (0.5 MTCO2/MWh) or 1,100 pounds carbon dioxide per megawatt-hour (1,100 lbs CO2/MWh) (20 CCR 2900 et seq.). California's state-specific policies, including GHG goals, are discouraging or prohibiting new contracts and new investments in high GHG-emitting facilities such as coal-fired generation, generation that relies on water for once-through cooling, and aging power plants (CEC 2007). Some existing plants are likely to require substantial capital investments in order to continue operating in light of these policies and may instead be retired or be replaced. For additional discussion of relevant federal level regulations and requirements for assessing the potential impacts of climate change, please refer to Section 3.3. The GSEP could provide 250 MW of renewable energy generation capacity to partially offset the resulting loss in supply.

## 4.3.2 Discussion of Direct and Indirect Impacts of the Proposed Action on Climate Change

Although the system to deliver adequate and reliable electricity supply is complex and variable, it operates as an integrated whole to meet demand, such that the dispatch of a new source of generation generally curtails or displaces one or more less efficient or less competitive existing sources. The GSEP would provide a new, utility-scale source of solar energy to complement existing and proposed sources of renewable energy. When the sun shines and electricity is generated by the GSEP, the real-time output required from fossil fuel plants would be reduced by the amount of renewable generation going into the electrical grid to maintain the balance between the supply and demand for electricity, thereby causing a measurable decrease in GHG emissions from fossil fuel plants. As analyzed below, construction of the GSEP would involve the use of construction equipment and operation of motor vehicles and operation of the GSEP would involve the generation of electricity using fossil fuels, at least to the extent required to operate

any back-up generators at the thermal solar plant. Thus, construction and operation of the GSEP would produce GHGs.

## Construction of the GSEP

Construction of industrial facilities such as power plants requires coordination of numerous equipment and personnel. The estimated 39-month construction period for the GSEP would require on-site construction activities that would result in short-term, unavoidable increases in vehicle and equipment emissions, including GHGs. The GHG emissions estimate, for the entire construction period, is provided in Table 4.3-1.

**TABLE 4.3-1**
**GSEP CONSTRUCTION-RELATED GREENHOUSE GAS EMISSIONS**

| Construction Element | $CO_2$-Equivalent (MT $CO_2E$)[a,b,c] |
|---|---|
| On-Site Construction Equipment | 24,094 |
| Gas Pipeline Construction Equipment | 1,544 |
| Access Road Construction Equipment | 564 |
| Transmission Line Construction Equipment | 1,185 |
| Delivery Vehicles (Construction Period) | 3,520 |
| Construction Worker Vehicles | 22,067 |
| ***Construction Total*** | ***52,974*** |

NOTES:

[a] One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms
[b] The vast majority of the CO2E emissions, over 99 percent, is $CO_2$ from these combustion sources.
[c] This does not include the revised construction description that now includes an onsite concrete batch plant and on-site fuel depot. On balance staff believes that these changes will not significantly impact the totals, which might be estimated to be higher or lower depending the balance of how concrete and fuel deliveries would have been handled versus the deliveries of the materials to make concrete (sand, aggregate, cement, water) and daily fueling of equipment by fuel/lube truck(s).

SOURCE: CEC, RSA (June 2010), Appendix AIR-1, Greenhouse Gas Table 2.

In addition to direct emission of GHGs, construction of this 1,746-acre proposed action also would cause the clearing of land and complete removal of vegetation over most of the project site. This would reduce the ongoing natural carbon uptake by vegetation. A study of the Mojave Desert indicated that the desert may uptake carbon in amounts as high as 100 grams per square meter per year (Wohlfahrt et. al. 2008). This would equate to a maximum reduction in carbon uptake, calculated as $CO_2$, of 1.48 MT of $CO_2$ per acre per year for areas with complete vegetation removal. The maximum equivalent loss in carbon uptake for the GSEP would be about 2,584 MT of $CO_2$ per year, which would correspond to 0.007 MT of $CO_2$ per MWh generated. Compared to the $CO_2$ emissions that would be associated with the generation of fossil fuel in amounts comparable to energy to be supplied by the proposed action (fossil fuel energy generation-related GHG emissions can range from 0.35 to 1.0 MT of $CO_2$ per MWh depending on the fuel and technology), the natural carbon uptake loss caused by construction of the GSEP would be negligible.

## Operation and Maintenance of the GSEP

Electricity generation GHG emissions are generally dominated by $CO_2$ emissions from the carbon-based fuels; other sources of GHG are typically small and also are more likely to be easily controlled or reused/recycled. For this solar project, the primary fuel (solar energy) is GHG-free; however, natural gas would be used in the two auxiliary boilers used for HTF freeze protection, and gasoline and diesel fuel would be used in the maintenance vehicles, offsite delivery vehicles, staff and employee vehicles, the four emergency fire water pump engines, and four emergency generator engines. Sulfur hexafluoride emissions also could result from electrical equipment leakage. Anticipated annual operations-related GHG emissions of the GSEP are shown in Table 4.3-2. All emissions are converted to $CO_2$-equivalent and totaled.

**TABLE 4.3-2**
**GSEP OPERATING GREENHOUSE GAS EMISSIONS**

| | **Annual CO2-Equivalent (MTCO2E)**[a] |
|---|---|
| Auxiliary Boilers[b] | 3,520 |
| Emergency Generators[b] | 83.9 |
| Fire Pumps[b] | 17.5 |
| Maintenance Vehicles[b] | 194.1 |
| Delivery Vehicles[b] | 42 |
| Employee Vehicles[b] | 272.3 |
| Equipment Leakage (SF6) | 3.4 |
| **Total Project GHG Emissions – $MTCO_2E$**[b] | **4,133** |
| Facility MWh per year | 600,000 |
| Facility GHG Emission Rate (MTCO2E/MWh) | 0.0070 |

NOTES:
[a] One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
[b] The vast majority of the CO2E emissions, over 99 percent, is CO2 from these emission sources.

SOURCE: CEC, RSA (June 2010), Appendix AIR-1, Greenhouse Gas Table 3.

The proposed action is estimated to emit, directly from primary and secondary emission sources approximately 4,100 metric tons of $CO_2$-equivalent GHG emissions per year. GSEP, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]). Regardless, GSEP has an estimated GHG emission rate of 0.007 MTCO2E/MWh, which is well-below the Greenhouse Gas Emission Performance Standard of 0.500 MTCO2/MWh.

The beneficial energy and GHG impacts of the GSEP also could be measured in terms of the time required to produce an amount of energy as great as what was consumed during production, which, in the context of a solar power plant, includes all of the energy required during construction and operation. Within the realm of life cycle analysis, this amount of time is called the “energy payback time.” Tables 4.3-1 and 4.3-2 provide an estimate of the onsite construction and operation

emissions, employee transportation emissions, and the final segment of offsite materials and consumables transportation. However, there are additional direct transportation and indirect manufacturing GHG emissions associated with the construction and operation of the proposed action, all of which are considered in the determination of the energy payback time. A document sponsored by Greenpeace estimates that the energy payback time for concentrating solar power plants, such as GSEP, to be on the order of five months (Greenpeace 2005, Page 9); the project life for GSEP is on the order of 30 years. Therefore, the proposed action's GHG emissions reduction potential from energy displacement would be substantial. The GHG displacement for the GSEP would be similar to, but not exactly the same as, the amount of energy produced after energy payback is achieved multiplied by the average GHG emissions per unit of energy displaced.[1]

## Closure and Decommissioning of the GSEP

Closure and decommissioning-related activities would emit GHGs when the facility is dismantled and the site is restored. It is anticipated that such emissions would be caused by the operation of construction equipment and motor vehicles; related impacts would be a one-time, limited-duration event. GSEP-specific contributions to global climate change during the closure and decommissioning phase are evaluated using the same methods as initial construction emissions, and are anticipated to be comparable in type and magnitude, but likely to be lower than, the construction emissions as discussed above.

## Mitigation Potential of the GSEP on Climate Change

As discussed previously, the GSEP would generate approximately 600,000 MWh of power per year, with a GHG emission rate of less than 0.01 MT of $CO_2$ per MWh. The power produced by the GSEP would offset power production by fossil-based power plants, which can range from 0.35 to 1.0 MT $CO_2$ per MWh. The electric power produced from the GSEP would be imported onto California's power grid, and would be used preferentially to conventional fossil fuel based power generation, including natural gas combined cycle plants, natural gas single cycle peaking plants, and power imported from other states, which may include power from coal-fired plants. Therefore, the Project would provide a direct benefit to climate change – namely the offset of up to approximately 600,000 MWh/yr of carbon dioxide-emitting power derived from existing/conventional fossil fuel power plants. Additionally, assuming that reductions in demand for existing fossil power would reduce demands for the natural gas and coal feedstocks used for those power plants, some degree of offset of upstream carbon dioxide, methane, nitrous oxide, and other GHG emissions associated with natural gas and coal extraction and transport, will also be realized. Therefore, implementation of the Project will provide direct and indirect benefits that counter the potential effects of climate change. The Project supports and is part of a transition towards increased in-state, national, and global renewable power production, which is a key component towards the mitigation of climate change.

[1] The average GHG emissions for the displaced energy over the project life is not known, but currently fossil fuel fired power plants have GHG emissions that range from 0.35 MT/MWh CO2E for the most efficient combined cycle gas turbine power plants to over 1.0 MT/MWh for coal fired power plants.

## 4.3.3 Direct and Indirect Impacts of the Proposed Action on Climate Change

In addition to simple warming, climate change also is expected to result in a suite of additional potential changes that could affect the natural environment, in a manner that is relevant to the GSEP. The potential for climate change effects on the proposed action is discussed below.

### Hydrologic Resource

In California and much of the U.S. West, climate change is expected to result in several potential effects related to water resources. These include potential sea level rise, potential changes in the frequency of flooding and droughts, and potential reductions in surface water supply.

### Sea Level Rise

Sea level rise is expected to occur as a result of increased global temperatures. Increased global temperatures include increases in ocean temperature, as well as air temperature. As water temperature increases, the water contained in the world's oceans would undergo thermal expansion. Increased temperatures could also result in a net melting/reduction in the extent of polar ice sheets. These effects could result in an increase in the level of the world's oceans, and some degree of sea level increase has already been established over the last century. However, these potential effects are not expected to affect the GSEP, which would be located approximately 150 miles from the ocean, and at an elevation of at least 370 feet mean sea level (msl). The proposed action would not be affected by sea level rise.

### Snowpack and Snowmelt Period

Changes in snowpack and snowmelt period are anticipated in California, as a result of climate change. Similar effects are anticipated in the Colorado River system, which includes the Chuckwalla Valley Basin and the action area (see Sections 3.20 and 4.19 for additional discussion). Specifically, climate change is expected to result in generally warmer temperatures, which, in turn, would result in a greater proportion of total annual precipitation falling as rain. Snowpack in California and the Colorado River watershed serves as a temporary means of water storage, wherein water is released slowly and into the early summer during snowmelt. If a greater proportion of precipitation falls as rain, the snowpack would be lessened, and the potential for water storage within the snowpack also would be lessened. Also, warmer temperatures would cause earlier snowmelt events, potentially reducing the ability of water managers to capture snow melt in reservoirs. However, there is no snowpack in the vicinity of the proposed action, and the GSEP is not dependent on snowmelt water for water supply. Therefore, the GSEP would not affect snowpack, and would not be deleteriously affected by potential changes in snowpack characteristics.

## Dilution

Dilution refers to the amount of water that is available in a receiving water body into which wastewater is discharged. Under some circumstances, climate change could result in a change in the volume or timing of water flows that are available in stream for dilution of wastewater. However, the GSEP would not discharge wastewater to surface waters (a septic system is included for on-site wastewater, and process water is controlled on site via an evaporation pond system). Therefore, potential climate-related changes in dilution capacity would not affect the proposed action.

## Water Temperature

Water temperature can be critical to fisheries resources in parts of California, in particular, along those waterways that support cold water fisheries. However, the site and its vicinity do not contain any perennial surface waterways that could support fisheries. During rain events, surface water from the site drains into Ford Dry Lake, which is considered a dry playa, and does not support any fisheries resources. The GSEP would rely on groundwater for a water supply, and the temperature of the groundwater would not be critical to GSEP operation. Furthermore, the GSEP would not result in any water discharge or other activity that would affect water temperature along the Colorado River or other rivers or waterways that support fisheries. No component of the GSEP would alter reservoir flows or otherwise change water management operations, such that water temperature would be altered. Therefore, potential changes in water temperature would not affect the GSEP, and no further discussion is warranted.

## Flooding, Drainage, and Erosion

Climate change is anticipated to affect the frequency and intensity of extreme weather events, including large storm events and droughts, in western watersheds including the Colorado River basin. Although the degree of change is a subject of substantial debate, most investigations concur that the Colorado River watershed, including the GSEP area, would experience an increase in the frequency and intensity of high rainfall/flood events. This could result in an increase in potential stormwater runoff and flooding, and an increase in erosion and sedimentation on site and downstream from the site. Increases in the intensity or frequency of droughts are discussed in terms of water resources availability, below.

As discussed in Section 4.19, Water Resources, the GSEP would include a series of engineered facilities, including rerouted drainage/flood channels, berms, and on-site drainage facilities that would channel, retain, and otherwise manage stormwater and flood flows on site and in the areas immediately surrounding the site. Also discussed in Section 4.19, the GSEP would be designed to account for stormwater drainage and flood flows, and CEC Conditions of Certification (Appendix G) SOIL&WATER-8 through SOIL&WATER-11would require revisions to the GSEP's drainage report and plans, completion of a detailed FLO-2D analysis, and implementation of drainage channel design and channel erosion protection measures. Additionally, these Conditions of Certification have been updated and incorporated into the FEIS as mitigation measures WATER-10, WATER-11, and WATER-13 to include assessment of potential climate change effects on

water resources, and incorporation of GSEP design feature recommendations that would serve to offset potential drainage and flooding effects associated with climate change.

## Water Resources Availability

As discussed in Section 3.20 and Section 4.19, the site is located within the Chuckwalla-Ford Dry Lake watershed, a watershed that contains only ephemeral drainages and washes. Surface waters in the GSEP area and its immediate vicinity occur only during substantial precipitation events, where surface runoff occurs. There are no perennial streams or other perennial waterways located on site or hydrologically connected to the GSEP via surface waters. The GSEP would not rely on surface water for water supply during construction or operation. Instead, the GSEP would rely on groundwater for water supply during both construction and operation.

Estimates of the potential effects of climate change on the frequency and amount of rainfall in the west vary, however, most studies concur that in the desert southwest, some degree of reduction of precipitation would occur. Seager et al (2007) and Christensen et al (2004) completed extensive reviews and modeling of potential climate change effects on the Colorado River watershed and other southwestern watersheds, including several climate change scenarios. The authors conclude that precipitation and runoff within the watershed could generally decrease, while periods of drought could increase, resulting in an overall reduction in the availability of water along the Colorado River. These scenarios could result in moderate to substantial effects on water supply availability, and could affect the ability of water rights holders along the Colorado River to divert their full entitlements.

In the event that climate change results in reduced precipitation within the GSEP area and its vicinity, some degree of associated reduction in groundwater recharge from rainfall could occur. This situation would not result in increased water requirements by the proposed action, and would not result in additional groundwater pumping during project construction or operations. Therefore, even with potential reductions in total precipitation volume associated with future climate change, no increase in pumping would be required as a result of the effects of climate change.

If climate change does result in reduced recharge to the underlying groundwater basin, the potential cumulative effects on groundwater levels identified in Section 4.19 could be exacerbated. Mitigation measures WATER-1 through WATER-5 and WATER-15 would offset these effects in part. However, as discussed in the cumulative effects analysis discussion of Section 4.19, the combined operation of all of the foreseeable projects will have an impact on groundwater levels, and this effect could be exacerbated by anticipated reductions in groundwater recharge due to climate change.

## Biological Resources

Biological resources could be affected as a result of climate change in California. Distribution patterns of species are generally expected to shift according to regional changes in temperature and precipitation, while the location of wildlife migration corridors and the extent of invasive species also could be altered.

### *Fisheries*

The GSEP does not contain any perennial or other surface waters that contain fisheries resources, and would not affect or be affected by changes in fisheries characteristics. Therefore, no further discussion is warranted.

### *Habitat Values of Mitigation Lands*

As discussed in Section 4.17, Impacts to Vegetation Resources, and Section 4.21, Impacts to Wildlife Resources, implementation of the GSEP would require mitigation for biological resources values that would be lost as a result of implementation of the GSEP. As discussed in these sections, the proposed mitigation lands would be required to be equivalent in terms of habitat value, and at a replacement ratio of at least 1:1 (typically greater than 1:1, as specified in Sections 4.17 and 4.21) for direct impacts. Unfortunately, climate change could result in adverse effects on biological resources located on these mitigation lands. However, given that mitigation lands must be similar in biological resources value as compared to lost resources on site, it is anticipated that climate-related effects for the mitigation lands would be similar to those located at the GSEP site, if the GSEP were never built. Therefore, potential reductions in the biological resources values of mitigation land values resulting from climate change are expected to be similar to on-site conditions in the absence of the GSEP, and no further discussion is warranted.

## Hazards

Heat related hazards, including potential increases in wildfire and heat waves, could be exacerbated by climate change.

### *Wildfire Risks*

Potential risks associated with fire are discussed in Section 3.12, Public Health and Safety. Section 4.11, Impacts to Public Health and Safety, provides a discussion of potential fire-related risks, and also ensures that adequate fire control personnel, infrastructure, and associated planning would be completed and/or available to the GSEP, to ensure compliance with federal, state, and local regulations, and to ensure worker safety.

Climate change would result in a small but general increase in temperature, and could also result in an increase in the frequency of extreme weather events that could generate wildfires, such as increased frequency of drought and heat waves, during operation of the GSEP. In compliance with applicable regulations and mitigation proposed in Section 4.11, the Applicant would be required install a fire protection/control system on site in including a fire water supply system and associated infrastructure, and to comply with state and federal regulations regarding worker safety and training. Additionally, under CEC Condition of Certification WORKER SAFETY-7 (see Appendix G), the Applicant would be required to provide funding to the Riverside County Fire Department (RCFD) to ensure available resources to fight potential fires on site, while Condition of Certification WORKER SAFETY-9 would provide for joint training exercises with the RCFD. Although the risk of wildfire that could affect the site could increase as a result of climate change, these potential increases in risk are expected to be offset by ongoing compliance

with the worker safety and fire protection regulations and mitigation measures specified in Section 4.11. Therefore, no additional mitigation is warranted.

### *Heat Waves*

The frequency of occurrence and the severity of heat waves could increase as a result of climate change. Heat waves could result in increased potential risk to GSEP employees. However, Mitigation Measure WORKER SAFETY-2 (see Appendix G) would require implementation of an operation period heat stress protection plan that is based on and expands on Cal OSHA requirements. This plan would provide measures to protect workers against the effect of heat-related hazards, whether or not those hazards are caused by climate change. Although the frequency and/or intensity of heat wave events could increase as a result of future climate change, the heat stress protection plan would meet state requirements for worker safety. Therefore, no further discussion or mitigation is warranted.

## Other Issues

In addition to the issues discussed above, potential climate change related impacts associated with soil moisture and fugitive dust concentrations also warrant discussion.

### *Soil Moisture*

As discussed in Section 3.15, Soils Resources, and 4.14, Impacts on Soil Resources, almost all rainfall that occurs in this region of California is lost through evaporation and evapotranspiration, and soil moisture in the GSEP area and its vicinity is characteristically low. As discussed previously, although precise changes are impossible to predict, climate change could result in increases in extreme weather events, including droughts and heat waves, and an overall reduction in precipitation. These conditions could result in a concurrent reduction in soil moisture content at the site and regionally. However, reductions in soil moisture content would not affect GSEP-related operations, and would not require any change in water resources usage. Additionally, the proposed facilities would in no way support additional drying of soils on site, or otherwise exacerbate potential changes in soil moisture associated with climate change. Therefore, no additional change would occur, and no further discussion is warranted.

### *Fugitive Dust*

As discussed in Section 3.02, Air Resources, and Section 4.02, Impacts on Air Resources, fugitive dust emissions would require mitigation during operation of the GSEP. CEC Condition of Certification AQ-SC7 (see Appendix G) would mitigate operation period fugitive dust emissions to ensure compliance with state and local regulations and requirements. Although climate change could result in some degree of reduction of soil moisture, as discussed above, soil moisture is already very low under current conditions. Any further reductions in soil moisture would be minimal in terms of the absolute amount of water contained in on-site soils. Therefore, any potential further reductions in soil moisture associated with climate change are not anticipated result in a substantial increase in fugitive dust emissions, and the proposed Mitigation Measure would be sufficient to meet federal, state, and local requirements regarding fugitive dust.

## Direct and Indirect Impacts of GSEP Alternatives

### *Reduced Acreage Alternative*

The Reduced Acreage Alternative essentially would reduce the total construction-, operation- and decommissioning-related GHG emissions of the proposed action by approximately half, due to elimination of one of the two power blocks. Therefore, the total GHG emissions could be determined by multiplying the proposed action's GHG emissions provided in Tables 4.3-1 and 4.3-2 by 0.5. The benefits of the proposed action in displacing fossil fuel fired generation and reducing associated GHG emissions from gas-fired generation would be reduced by a factor of approximately 2. The extent of effects to biological resources and hydrologic resources would also be reduced, due to the reduced intensity of construction activities and reduced water requirements. However, the Reduced Acreage Alternative would not alter the potential effects of climate change on mitigation lands, drainage and flooding, or water resources availability. All other potential climate change related impacts would be the same as for the proposed action.

If the Reduced Acreage Alternative were selected, other renewable projects could be developed that would compensate for the loss of generation compared to the proposed action on other sites in the Riverside County, the Colorado Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and Federal and state mandates.

### *Dry Cooling Alternative*

The Dry Cooling Alternative would be the same as the proposed action, except that dry cooling would be implemented instead of wet cooling. Dry cooling minimizes water use at the facility, but has the trade-off of reduced efficiency. The Dry Cooling Alternative would utilize dry cooling technologies for the steam cycle heat rejection system, but would rely on a closed cooling water system for ancillary equipment cooling. Implementation of the Dry Cooling Alternative would result in substantially reduced water consumption by the power plant: 202 acre-feet per year (AF/y), as compared to 1600 AF/y for the proposed action.

Because the Dry Cooling Alternative would reduce the operational water requirements of the power plant, the Dry Cooling Alternative would also result in reduced potential for groundwater level reduction, as compared to the proposed action (for additional discussion, refer to Section 4.19, Impacts On Water Resources). However, implementation of the Dry Cooling Alternative would not alter the extent to which climate change would affect water supplies, flooding, drainage, or other climate related issues on site. Other potential impacts of climate change on the proposed action would be similar to those described for the proposed action.

In terms of GHG emissions, dry cooling is less efficient than wet cooling, and therefore the Dry Cooling Alternative would result in reduced power generation, as compared to the proposed action. Specifically, increased on-site demand for electricity, as compared to the proposed action, would require approximately 12% of the energy produced by the GSEP to be used on site to support dry cooling. This is equivalent to a 12% (72,000 MWh/yr) reduction in power output per year, that could otherwise be used to offset fossil power generation. Therefore, implementation of the Dry Cooling Alternative would result in slightly reduced GHG offsets produced by the GSEP.

### *No Action Alternative A*

None of the anticipated impacts, beneficial or adverse, of the proposed action would occur. Instead, the land on which the GSEP is proposed would become available to other uses consistent with BLM's land use plan, potentially including another renewable energy project.

If the proposed action is not approved, renewable projects would likely be developed on other sites in Riverside County, the Colorado Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and Federal and state mandates. In terms of potential impacts due to climate change, under No Action Alternative A, the proposed action would not be implemented, and, therefore, would not be affected by climate change. However, renewable projects developed on other sites in Riverside County, the Colorado Desert, or in adjacent sites would likely be subject to similar climate change effects as compared to the proposed action.

### *No Project Alternative B*

Because the CDCA Plan would be amended under this alternative to make the site unavailable for future solar development, it is expected that the site would remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, GHG emissions associated with the development of renewable energy projects would occur elsewhere and the carbon uptake potential of the site would not be expected to change noticeably from existing conditions. Consequently, this No Project Alternative would not result in GHG benefits on this site, but could occur in connection with other renewable energy projects developed elsewhere to meet State and Federal mandates. Such projects would likely have similar impacts on climate change as the proposed action, and climate change related impacts would likely affect such projects similarly to the proposed action, although in other locations.

### *No Project Alternative C*

Because the CDCA would be amended under this alternative, it is possible that the site would be developed with the same or a different solar technology. As a result, GHG emissions and carbon sequestration potential similar to that of the proposed action could result. Different solar technologies require different amounts of construction and operations maintenance, and different volumes of water during operations; however, it is expected that all the technologies would provide the more significant benefit, like the proposed action, of displacing fossil fuel fired generation and reducing associated GHG emissions. As such, No Project Alternative C could result in GHG benefits similar to those of the proposed action. In terms of potential climate change impacts on No Project Alternative C, these impacts would likely be similar to the proposed action, although metrics related to project size and water use could vary somewhat based on the selected power generation technology.

## Summary of GSEP-Specific Mitigation Measures

The implementation of mitigation measures imposed by the Energy Commission as Conditions of Certification for the GSEP also would avoid or reduce impacts on the quality of the human

environment. These Conditions of Certification are set forth in Appendix G. The following mitigation measures would avoid or minimize impacts on global climate change:

AQ-SC2, AQ-SC5, AQ-SC6

AQ-1, AQ-2, AQ-3, AQ-4, AQ-5, AQ-6, AQ-7, AQ-9, AQ-10, AQ-11, AQ-12, AQ-13, AQ-14, AQ-15. AQ-16, AQ-17, AQ-19, AQ-20, AQ-21, AQ-22, AQ-23, AQ-24, AQ-25, AQ-26, AQ-27, AQ-33, AQ-34, AQ-39, AQ-40

## 4.3.4 Residual Incremental, GSEP-specific Impacts after Mitigation Measures Were Implemented

The residual GHGs emitted from construction were estimated to be 52,974 metric tons of C CO2 equivalent for construction and 4,133 metric tons/year CO2 equivalent for a total of 176,964 tons CO2 equivalent over the life of the GSEP.

## 4.3.5 GHG Emissions Associated with Past, Present and Reasonably Foreseeable Future Actions

### GHG Emissions from Past, Present and Reasonably Foreseeable Actions

As stated above, human activities are widely-recognized as being primarily responsible for the changing (warming) global climate. Such activities result in emissions of carbon dioxide and other GHGs from industrial processes, fossil fuel combustion, and changes in land use, such as deforestation. For example, in 1990, industrial processes and electric power generation caused the majority of human-generated global GHG emissions, contributing 32 percent and 20 percent, respectively (Pew, 2010a). Within the United States, which emitted over seven billion metric tons of CO2E in 2004; in that year, industry emitted 30 percent of the total, transportation emitted 28 percent, the commercial sector emitted 17 percent, the residential sector emitted 17 percent, and agriculture emitted 8 percent (Pew, 2010b). Industrial processes, power generation, land use changes and other actions contributing to climate change are expected to continue in the foreseeable future, subject to increasingly stringent requirements.

The proposed GSEP and other present and reasonably foreseeable future actions, including those identified in Section 4.1, would contribute construction-, operation and maintenance-, and closure and decommissioning-related GHG emissions impacts and benefits in the existing international, national, State-wide and regional context. Internationally, this context includes, among many other efforts, the Bali Roadmap, which was adopted in 2007 to launch negotiations toward a new global climate agreement; and the Copenhagen Accord, which was reached at the 2009 U.N. Climate Change Conference and provides for explicit national GHG emissions reduction pledges. The international context also includes urbanization by developing countries, deforestation and development-related conversion of agricultural lands.

The national context includes GHG-related activity by all branches of government, including the GHG Emissions Reduction Target for Federal Operations set by President Obama in January

2010; proposed legislation including the American Clean Energy and Security Act of 2009 (H.R.2454), the Clean Energy Jobs and American Power Act of 2009 (S.1733), and the American Clean Energy Leadership Act of 2009 (S.1462); and attention to climate change issues by the nation's highest court. *Massachusetts et al. v. Environmental Protection Agency*, 549 U.S. 497 (2007).

Recent State-level GHG-related actions include the California Air Resources Board's February 25, 2010, adoption of a regulation to limit and monitor sulfur hexafluoride (SF6) emissions from electric power sector equipment; the California Building Standards Commission's January 14, 2010, approval of the most environmentally stringent building code in the United States, which will go into effect in January 2011 and which the California Air Resources Board (CARB) anticipates will reduce GHG emissions by 3 million metric tons in 2020; and CARB's September 24, 2009, adoption of a revised Forest Project Protocol that allows private landowners, public lands, and out-of-state projects to participate in the State's voluntary forestry offsets market – it is the first state-approved carbon accounting standard that is applicable to projects nationwide. Additionally, the adoption of Senate Bill 375 (SB 375) in 2008 enhances California's ability to reach its AB 32 goals by providing regional planning-related GHG emissions-reduction goals.

Regionally, based on SB 375, the Southern California Association of Governments' six-county area (including Riverside, San Bernardino, Orange, Los Angeles, Imperial and Ventura counties) must reduce its annual GHG emissions by 2.5 million metric tons by 2020. Local governments are considering GHG and related emissions reductions in their planning efforts. For example, the Riverside County Transportation Demand Management Program (Riverside County Code Ch. 10.36) is intended in part to reduce motor vehicle emissions, which include GHGs. In turn, San Bernardino County, which has been a focal point in conflicts over local climate regulation, has updated its General Plan and otherwise incorporates GHG emissions reduction considerations into its local planning decision-making process (OPR, 2010).

Overall, it is expected that the GSEP would enhance the attainment of international, national, Statewide and regional GHG reduction efforts.

## Environmental Consequences of Climate Change

Beneficial and adverse impacts of GHG emissions caused by the proposed action, together with GHG emissions-related impacts of past, present and reasonably foreseeable future actions, would contribute to cumulative global climate change impacts on the various elements of human society and the environment that are sensitive to climate variability. For example, human health, agriculture, natural ecosystems, coastal areas, and heating and cooling requirements are examples of climate-sensitive systems. Globally, rising average temperatures are believed to have caused glaciers to shrink, permafrost to thaw, ice on rivers and lakes to freeze later and break up earlier, growing seasons to lengthen, and animal and wildlife ranges to shift. In North America, warming in western mountains is expected to cause decreased snowpack, more winter flooding, and reduced summer flows, thereby exacerbating competition for over-allocated water resources. Extended periods of high fire risk and large increases in areas burned – each a risk of global warming – would increase impacts on forests from pests, diseases and wildfire. Areas that

currently experience periods of extreme heat are expected to be further challenged by an increased number, intensity and duration of heat waves during the course of the century, with potential for adverse health impacts particularly for elderly populations. (IPCC, 2007). For a review of how climate change could affect the proposed action and alternatives, please see the previous subsection, “Direct and Indirect Impacts of Climate Change on the Proposed Action.”

## Mitigation Measures to Reduce Impacts on Global Climate Change

As stated above, implementation of mitigation measures imposed by the BLM in a right-of-way and the Energy Commission as Conditions of Certification for the GSEP also would avoid or reduce incremental, GSEP-specific impacts on the quality of the human environment. These mitigation measures are set forth in the FEIS, Appendix G, and are summarized above. Additionally, it is expected that each of the projects that comprise the cumulative scenario, other federal projects, and other projects within the State of California would likely be subject to similar types of mitigation measures to address contributions to climate change impacts. Additional voluntary and obligatory measures could apply to projects at the local or international level.

# 4.4 Impacts on Cultural Resources

## 4.4.1 Impact Assessment Methodology

The basic regulatory process for assessing impacts on cultural resources consists of the following five steps:

1. Determining the appropriate geographic extent of the analysis for the proposed action and for each alternative action under consideration;

2. Producing a cultural resources inventory for each such geographic area;

3. Determining the historical significance of the cultural resources in the inventory for each geographic area, unless the construction, operation and maintenance, and decommissioning and closure of the proposed or alternative actions will avoid particular resources;

4. Assessing the character and the severity of the effects of the proposed and alternative actions on the historically significant cultural resources in each respective inventory that cannot be avoided; and

5. Developing measures that would resolve those effects that are found to be significant.

Further details of each of these phases follow below and help provide the parameters of the present analysis.

### The Area of Potential Effects

The regulations for implementing Section 106 of the NHPA define the Area of Potential Effects (APE) as the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist. The area of potential effects is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking (36 CFR 800.16(d)). For purposes of complying with Section 106, the APE for the GSEP consists of the following:

1. For archaeological resources, the APE is defined as the GSEP disturbance area plus a buffer of 200 feet around this area, and the GSEP linear facilities routes, plus a buffer of 50 feet to either side of the rights-of way for these routes, and the maximum depth that would be reached by all foundation excavations and by all pipeline installation trenches.

2. For ethnographic resources, the APE is expanded to take into account historic properties to which Indian Tribes may attach religious or cultural significance which may be further afield than the GSEP site footprint or right-of-way, including the visual setting that may contribute to the historical integrity of the resources. Ethnographic resources are often identified in consultation with Native Americans and other ethnic groups, and issues that are raised by these communities may define the APE. For the GSEP the ethnographic APE is the geographic area around and including the proposed GSEP where the project has the potential to directly or indirectly alter the character or use of ethnographic resources that are historic properties.

3. For built-environment resources in the rural context of the GSEP, the APE is defined as the GSEP site and any above-ground linear facilities, plus a half-mile buffer. As the GSEP is located in an undeveloped area, the APE was reduced to include only the above-ground linear facilities and a half-mile buffer.

### Assessing Effects

The core of a cultural resources analysis under NEPA and Section 106 is the assessment of the character of the effects that a proposed or alternative action may have on historically significant cultural resources. The analysis takes into account direct, indirect, and cumulative effects.

In accordance with 36 CFR § 800.5 of the ACHP's implementing regulations, which describes criteria for adverse effects, impacts on cultural resources are considered significant if one or more of the following conditions would result from implementation of the proposed action:

1. An undertaking has an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the NRHP. For the purpose of determining the type of effect, alteration to features of a property's location, setting, or use may be relevant, depending on the property's significant characteristics, and should be considered.

2. An undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to:

    a. Physical destruction, damage, or alteration of all or part of the property
    b. Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the NRHP
    c. Introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting
    d. Neglect of the property, resulting in its deterioration or destruction
    e. Transfer, lease, or sale of the property

Consideration is given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative. A formal effect finding under Section 106 relates to the proposed or alternative action as a whole rather than relating to individual resources.

## 4.4.2 Direct and Indirect Effects

### Proposed Action

Direct and indirect effects are those that are more clearly and immediately attributable to the implementation of proposed or alternative actions. Direct and indirect effects are those "which are caused by the [proposed or alternative] action and [which] occur at the same time and place"

(40 CFR § 1508.8(a)). Indirect effects are those "which are caused by the [proposed or alternative] action and are later in time or farther removed in distance, but are still reasonably foreseeable" (40 CFR § 1508.8(b)).

The Section 106 regulations narrow the range of direct effects and broaden the range of indirect effects relative to the definitions of the same terms under NEPA. The regulatory definition of "effect," pursuant to 36 CFR Section 800.16(i), is that the term "means alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register." In practice, a "direct effect" under Section 106 is limited to the direct physical disturbance of a historic property. Effects that are immediate but not physical in character, such as visual intrusion, and reasonably foreseeable effects that may occur at some point subsequent to the implementation of the proposed undertaking are referred to in the Section 106 process as "indirect effects."

Ground-disturbing construction activities associated with the GSEP can directly impact cultural resources by damaging and displacing artifacts, diminishing site integrity and altering the characteristics that make the resources significant. In addition, in the case of historic architectural resources and places of traditional cultural importance, impacts can occur to the setting of a resource even if the resource is not physically damaged.

Based on graphical representations showing the anticipated disturbance below ground and the anticipated above-ground intrusion into the flat landscape, impacts associated with the GSEP potentially affecting cultural resources, which include:

1. General cutting and filling would disturb the overall GSEP plant site to a maximum depth of 2 feet.

2. In the solar array fields, GSEP collector foundation excavations would cause ground disturbance down to an unspecified depth, and the collectors would intrude into the flat landscape to a maximum height of 25 feet.

3. In the power blocks, GSEP equipment foundation excavations would cause ground disturbance down to a maximum depth of 25 feet, and the equipment would intrude into the flat landscape to a maximum height of 75 feet.

4. Along the linear facilities corridor, GSEP natural gas pipeline trench excavations would cause ground disturbance down to a maximum depth of 10 feet. The transmission line supports would cause ground disturbance down to a depth of 15 feet and create an intrusion into the flat landscape to a maximum height of 75 feet.

Based on this information all archaeological resources, and possibly additional resources yet to be discovered during construction, located within the full extent of the GSEP's surface and below-grade impacts (inclusive of foundations and trenches) would be adversely affected by the GSEP.

Based on preliminary evaluations of NRHP eligibility, the proposed GSEP would directly impact 27 significant archaeological resources (see Table D-9). These include:

1. 12 prehistoric-to-historic period Native American archaeological sites, 6 of which are potential contributing elements to a potential Prehistoric Trails Network Archaeological Landscape (PTNAL); and

2. 15 historic-period archaeological sites that are potential contributing elements to a World War II Desert Training Center California-Arizona Maneuver Area Historic Archaeological Landscape (DTCHAL).

In addition, the proposed GSEP would indirectly impact 248 sites that are contributors to the potential Prehistoric Trails Network Archaeological Landscape (PTNAL) (see 3.4-16 and 3.4-39 through 3.4-41).

The two built-environment resources identified within the GSEP area would not be directly impacted by the GSEP, nor would the integrity of their settings be adversely affected by the GSEP.

With respect to direct impacts, if, during operation of the GSEP, the applicant should plan any changes or additions entailing significant amounts of ground disturbance, the applicant would have to obtain authorization from the BLM. The BLM would determine if previously undisturbed sediments would be affected by the planned activities and, if so, require the implementation of existing identification, evaluation and treatment measures or devise new ones to mitigate any impacts to significant known or newly identified cultural resources in accordance with the Programmatic Agreement being developed for the GSEP.

With respect to indirect impacts during operation of the GSEP, cultural resources on and in the immediate vicinity of the GSEP site may experience increased vandalism, illegal collection of artifacts, and/or destruction of resources by vehicles traveling on the site, as a result of improved access due to the GSEP's construction. Construction and operation of the GSEP would also introduce visual elements that are out of character with the potential PTNAL and DTCHAL historic landscapes, thereby affecting the integrity of their setting, feeling and association[1]. The Programmatic Agreement (PA) will include provisions to address these possible indirect effects.

McCoy Springs National Register District, one of the 248 sites identified as contributing to the potential PTNAL, is the largest concentration of petroglyphs in the region and may be indirectly affected by the proposed GSEP. The site is listed on the National Register of Historic Places and is located on the west side of the McCoy Mountains approximately 5 miles from the Wiley's Well Rest Area. Persons needing access to the GSEP site footprint and linear facilities corridor for construction workers and permanent staff will share the rest area as an access point. The proposed GSEP will involve an average of 650 employees for 37 months (GSEP 2009a, p. 3-26). Traffic and off-road exploration of the areas surrounding the GSEP site will undoubtedly increase.

[1] *Setting* is the physical environment of a historic property. It refers to the character of a place in which the property played its historical role. *Feeling* is the property's expression of the aesthetic or historic sense of a particular period of time. It results from the presence of physical features that, taken together, convey the property's historic character. *Association* is the direct link between an important historic event or person and a historic property. A property retains association if it is the place where the event or activity occurred and is sufficiently intact to convey that relationship to an observer. Like feeling, association requires the presence of physical features that convey a property's historic character (NPS 1990).

Possible effects to the McCoy Springs site include vandalism as the result of increased visitation in addition to changes in the integrity of setting, feeling, and association. Evaluations and consultations carried out pursuant to the Programmatic Agreement being developed for the GSEP will determine whether Native American traditional values are ascribed to the McCoy Springs site that may be affected by the GSEP.

## Closure and Decommissioning

Cultural resources within the proposed GSEP site footprint and linear facilities corridor are most likely present within the first 2 feet below the current ground surface. The construction of GSEP is expected to destroy all known and unknown cultural resources within the site footprint and most of the linear facilities corridor. Therefore the closure and decommissioning of the proposed GSEP is unlikely to cause additional impacts to known or previously unknown cultural resources. However, sites within the linear facilities corridor and near the boundary of the proposed GSEP footprint may still exist after GSEP construction and associated archaeological data recovery. These sites may be impacted by activities associated with GSEP closure and decommissioning.

## Differences Among Alternatives

### *Reduced Acreage Alternative*

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed GSEP, including a 125-MW solar facility located within the boundaries of the proposed GSEP as defined by the applicant. This alternative eliminates about 50 percent of the proposed site footprint so impacts are reduced.

This alternative is located entirely within the boundaries of the proposed GSEP, so all of the aspects of the setting and existing conditions for the GSEP are also pertinent to this alternative except the project description. The project description for this alternative eliminates the eastern solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed GSEP, as well as the area affected by the linear GSEP components.

Cultural resource surveys completed by the applicant identified 20 cultural resources within the Reduced Acreage Alternative site footprint. These cultural resources include 14 prehistoric Native American sites, 3 historic artifact scatters, 2 built environment resources, and 1 possible ethnographic resource. The significance (NRHP eligibility) of these resources has not yet been determined. The two built-environment resources identified within the project area would not be directly impacted by the GSEP, nor would the integrity of their settings be adversely affected by the GSEP.

Indirect impacts to the integrity of setting, feeling and association of the potential PTNAL and DTCHAL, including possible indirect impacts to McCoy Springs National Register District, would be the same under this alternative as under the proposed action.

### *Dry Cooling Alternative*

This alternative is located entirely within the boundaries of the proposed GSEP. It eliminates the use of wet-cooling towers and incorporates the use of air-cooled condensers (ACC) in the same location. As a result, the APEs would be the same as for the proposed GSEP.

In the Dry-Cooling Alternative, the ACC units would be located in the same place as the proposed cooling towers in an area that would be graded for construction parking and construction trailers. No additional ground disturbance would be necessary for the use of the ACC units. Therefore, no additional impacts to known and unknown cultural resources would be expected beyond the impacts identified for the proposed GSEP.

However, the ACC units would be approximately 98-120 feet tall. This would be more than twice as tall as any other GSEP structure (GSEP 2009a) and would be taller than the wet cooling towers. The ACC units would be slightly more visible than any other GSEP structure, depending on the viewing distance, which could increase visual impacts on the potential PTNAL and DTCHAL, including McCoy Spring National Register District. Therefore, indirect impacts to the potential PTNAL and DTCHAL, including McCoy Spring National Register District, would be greater when compared to the proposed GSEP.

### *No Action Alternative A*

Under this alternative, the proposed GSEP would not be approved by the BLM, and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the GSEP site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would not be amended and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no new ground disturbance. As a result, no loss or degradations to cultural resources from construction or operation of the proposed GSEP would occur. However, the land on which the GSEP is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land-use plan amendment. In addition, in the absence of the GSEP, other renewable energy projects may be constructed elsewhere to meet state and federal mandates, and those projects would have similar impacts in other locations.

### *No Project Alternative B*

Under this alternative, the proposed GSEP would not be approved by the BLM, and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the GSEP site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, ground disturbance would result from the construction and operation of the solar technology and would likely result in a loss or degradation to cultural

resources. Different solar technologies require different amounts of grading and maintenance; however, it is expected that all solar technologies require some grading and ground disturbance. As such, No Project Alternative B could result in impacts to cultural resources similar to the impacts of the proposed GSEP.

### *No Project Alternative C*

Under this alternative, the proposed GSEP would not be approved by the BLM, and BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the GSEP site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no corresponding land disturbance. As a result, the cultural resources of the site would not be expected to change noticeably from existing conditions. Therefore, No Project Alternative C would not result in impacts to cultural resources. However, in the absence of the GSEP, other renewable energy projects may be constructed elsewhere to meet state and federal mandates, and those projects would have similar impacts in other locations.

## 4.4.3 Discussion of Cumulative Impacts

The regulations implementing Section 106 of the NHPA contemplate close coordination between the NEPA and NHPA processes (36 CFR 800.8), and expressly integrate consideration of cumulative concerns within the analysis of a proposed action's potential direct and indirect effects by defining "adverse effect" to include "reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative" (36 CFR 800.5(a)(1)).

For the cultural resources cumulative analysis, the regional scope was defined at two levels: local and regional. At the local level, the geographic area considered for cumulative impacts on cultural resources is an area on either side of I-10 referred to here as the I-10 Corridor. The area is broadly equivalent to a 4-mile-wide strip (2 miles to either side of I-10) 48 miles long, between Blythe and Desert Center, with an area of 192 square miles (122,440 acres). Although the total number of cultural resources present in this area is unknown, an estimate can be derived based on recent surveys related to three proposed solar power projects (Genesis Solar Energy Project, Palen Solar Power Project and Blythe Solar Power Project) which surveyed a total of 19,184 acres. These projects recorded 329 sites, indicating that the Corridor has an average site density of 0.017 cultural resources per acre. This figure suggests that the Corridor originally contained approximately 2,081 cultural resources.

At the regional level, the geographic area considered for cumulative impacts on cultural resources is the desert areas of southeastern California, southern Nevada, and western Arizona. In broad

terms, the area covered in this analysis includes the 25-million-acre California Desert Conservation Area. Approximately 20 percent of Riverside and San Bernardino counties have been surveyed for cultural resources. These surveys have identified and documented more than 20,000 cultural resources. These results suggest that there is a high potential to discover previously unknown resources within the cumulative study region.

## Impacts of Existing Projects

### *I-10 Corridor*

At the regional level, the construction of Chuckwalla Valley and Ironwood State Prisons have disturbed approximately 1,720 acres, suggesting that 29 sites were destroyed during this project.

The construction of I-10, a four-lane divided highway, with associated bridges, off-ramps, and berm system, also resulted in significant ground disturbance in the Corridor. Assuming a width of a minimum of 200 feet and a length of 48 miles, this project disturbed approximately 2,328 acres within the I-10 Corridor, suggesting that 40 sites were destroyed during this construction.

Another linear project within the Corridor was the Devers-Palo Verde Transmission Line, a 500-kV transmission line paralleling I-10. Based on the construction of the access road and excluding the transmission tower pads, a width of 20 feet and a length of 48 miles was assumed for this analysis. A similar calculation was made for the Blythe-Eagle Mountain Transmission Line and a natural gas line, both of which were constructed parallel to I-10. This analysis estimates that during the construction of these three linear projects, approximately 350 acres were disturbed, and 6 cultural resources were destroyed.

Finally, the mining activities at the Kaiser Eagle Mountain Mine may have disturbed more than 3,500 acres, destroying 59 cultural resources.

In total, together, the larger of the ground-disturbing projects within the I-10 Corridor disturbed at least 7,898 acres, or 6.4 percent of the Corridor. One hundred and thirty-three of the estimated 2,081 cultural resources were likely destroyed by these projects.

### *Southern California Desert Region*

Within the larger Southern California Desert Region, the most intensive use of the desert and concomitant disturbance of cultural resources has been on designated military installations (e.g., Edwards Air Force Base, Fort Irwin, Twentynine Palms Marine Corps Base, Chocolate Mountain Naval Aerial Gunnery Range) during Gen. Patton's military training from 1942 to 1944, and during later training maneuvers in May 1964, throughout the I-10 Corridor.

Cultural resources in the Southern California Desert Region have been primarily impacted by past and currently approved projects through the ground disturbance that is required for construction of buildings, facilities, roads, and other infrastructure. Military training operations have been the most destructive, particularly at bombing ranges.

In the case of military installations and maneuvers, however, avoidance of substantial adverse changes to NRHP-eligible cultural resources has been accomplished through deliberate project planning. Likewise, the severity of impacts to previously unknown cultural resources have been reduced by implementing mitigation measures requiring construction monitoring, evaluation of resources discovered during monitoring, and avoidance or data recovery for significant resources.

## Impacts of Reasonably Foreseeable Future Projects

Cultural resources are expected to be affected by reasonably foreseeable future projects. Some of these projects may not be built but this analysis estimates the maximum number of cultural resources that may be destroyed.

### *I-10 Corridor*

Numerous projects are proposed and under consideration along the I-10 Corridor. For the purposes of this analysis, it is assumed that the 13 proposed solar projects and Chuckwalla Raceway project would destroy all of the cultural resources within the proposed project limits. Together these reasonably foreseeable future projects would disturb 48,056 acres, or 39 percent of the total I-10 Corridor. This cumulative analysis suggests that these projects would destroy 816 cultural resources.

### *Southern California Desert Region*

The projects proposed for construction within the BLM California Desert District make a reasonable proxy for patterns across the larger area. Solar projects occupying 567,882 acres and wind projects occupying 433,721 acres have been proposed for this region, consisting of nearly 4 percent of the CDCA.

Although the cultural resources density per acre is unknown for this entire region, the density proposed for the I-10 Corridor serves as a reasonable minimum. The disturbance of 1 million acres would likely result in the destruction of at least 17,000 cultural resources.

Construction of the solar and wind projects proposed throughout this region would result in substantial changes in the setting, feeling, and association of the areas in which they are constructed. These kinds of impacts may be especially severe for traditional use areas and traditional cultural properties. Potential impacts would include direct impacts in the form of physical disturbance or alteration as a result of construction activity or indirect impacts in the form of diminished visual character of traditional use areas due to the presence of industrial structures.

## Contribution of the GSEP to Cumulative Impacts

The GSEP would directly impact 27 significant archaeological resources and indirectly impact two potential historic landscapes identified as present in the GSEP region. However, these impacts would be expected to contribute only a small amount to the possible permanent cumulative impacts related to cultural resources.

Almost all of the projects along the I-10 Corridor for which right-of-way applications have been submitted are on BLM or other federal land and, for this reason, are or would be subject to NEPA and the NHPA, which contain cultural resource-protective requirements related to investigations, impact assessment, avoidance and mitigation. It is anticipated that projects in the general vicinity of the site that are not on Federal land would be subject to CEQA; therefore, any related impacts on cultural resources would be subject to cultural-resource-protective requirements based on State law to avoid or minimize such impacts. Nonetheless, even with project-specific impacts on cultural resources avoided or minimized, historic properties on a substantial amount of land still would be affected. Cumulative impacts would vary by alternative only to the degree to which direct and indirect impacts would vary by alternative.

## 4.4.4 Summary of Mitigation Measures

Adverse effects that the proposed or alternative actions may have on cultural resources will be resolved through compliance with the terms of the BLM's PA under Section 106. Analysis of impacts in this document and implementation of the terms of the PA will evidence BLM's compliance with Section 106 and NEPA.

In accordance with 36 CFR § 800.14(b), PAs are used for the resolution of adverse effects for complex project situations and when effects on historic properties, resources eligible for or listed in the National Register of Historic Places (NRHP), cannot be fully determined prior to approval of an undertaking. The BLM will prepare a PA in consultation with the Advisory Council on Historic Preservation, the State Historic Preservation Officer, Indian tribes, and other interested parties. The PA will govern the conclusion of the identification and evaluation of historic properties (eligible for the NRHP), as well as the resolution of any adverse effects that may result from the proposed or alternative actions.

Treatment plans regarding historic properties that cannot be avoided by project construction will be developed in consultation with stakeholders as stipulated in the PA. When the PA is executed and fully implemented, the GSEP will have fulfilled the requirements of NEPA and Section 106 of the NHPA. The PA will be executed prior to BLM's approval of the Record of Decision for the Right-of-Way grant for the action.

To mitigate impacts to significant cultural resources, the mitigation measures imposed by the Energy Commission as Conditions of Certification for the GSEP also would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G. To the extent that the following mitigation measures are consistent with the PA developed by the BLM to comply with Section 106 of the NHPA, they also would be implemented to avoid or minimize impacts pursuant to NEPA:

To mitigate impacts to significant cultural resources, per CUL-19 from the Energy Commission's Conditions of Certification, to the extent the following mitigation measures imposed by the CEC for the GSEP are consistent with BLM's Programmatic Agreement developed to comply with Section 106 of the NHPA, they would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G as follows:

CUL-1, CUL-2, CUL-3, CUL-4, CUL-5, CUL-6, CUL-7, CUL-8, CUL-9, CUL-10, CUL-11, CUL-12, CUL-13, CUL-14, CUL-15, CUL-16, CUL-17

The BLM would also require the following mitigation measures be implemented to the extent they are consistent with BLM's PA:

**BLM-CUL-1:** The Applicant shall contribute to a program to document three cultural landscapes described in Chapter 3.4 that will, in part, be impacted by the GSEP. These are: (1) a Prehistoric Trails Network Archaeological Landscape (PTNAL), (2) a Desert Training Center California-Arizona Maneuver Area Historic Archaeological Landscape (DTCHALL), and (3) a Prehistoric Quarries Archaeological District (PQAD). The Applicant will follow the documentation program by contributing to the preparation of National Register of Historic Places (NRHP) nominations for the PTNAL, DTCHAL and PQAD if the BLM determines, after reviewing the documentation, that they are eligible for the NRHP.

**BLM-CUL-2:** If significant or potentially significant cultural resources cannot be avoided, the Applicant will retain a qualified Cultural Resources Specialist to prepare and implement a Historic Property Treatment Plan (HPTP) for the affected resources. The HPTP may include protocols for affected resources including data recovery, research design, and treatment measures. The Principal Investigator for the HPTP program will meet the minimum Principal Investigator qualifications under the Secretary of the Interior's Standards for Archaeology.

**BLM-CUL-3:** A designated Cultural Resources Specialist will provide input to construction and operation training programs for employees to enhance awareness regarding the protection of cultural resources. The designated specialist or a qualified cultural resources monitor will be available during construction to inspect and evaluate any finds of potentially significant buried cultural material. The Cultural Resources Specialist will coordinate with the Applicant's construction manager and environmental compliance manager to stop all work in the vicinity of the find until it can be assessed. The Cultural Resources Specialist will also contact the BLM. If the discovery is determined to be not significant through consultation with the BLM, work will be allowed to continue.

**BLM-CUL-4:** All discoveries will be documented on Department of Parks and Recreation forms (Form DPR 523) and filed with the California Historical Resources Information System (CHRIS) Eastern Information Center housed at the University of California, Riverside.

**BLM-CUL-5:** If, in consultation with the BLM, a discovery is determined to be significant, a mitigation plan will be prepared and carried out in accordance with Federal guidelines. If the resources cannot be avoided, a data recovery plan will be developed to ensure collection of sufficient information to address archaeological or historical research questions.

**BLM-CUL-6:** A professional technical report will be prepared documenting assessment and data recovery investigations. The report will describe the methods and materials collected and will provide conclusions regarding the results of the investigations. The report will be submitted to the curatorial facility housing the collected archaeological materials, as well as the appropriate California Historical Resources Information System center.

**BLM-CUL-7:** Cultural material collected as part of an assessment or data recovery mitigation will be curated at a qualified curation facility at the applicant's expense. Field notes and other pertinent materials will be curated along with the archaeological collection.

**BLM-CUL-8:** If human remains are encountered during construction, potentially destructive activities in the vicinity of the find will be stopped. The Cultural Resources Specialist will immediately notify the Principal Investigator, who will contact the BLM. The Applicant will ensure that any such remains are treated in a respectful manner and that applicable state and federal laws are followed. If human remains of Native American origin, associated funerary objects, sacred objects or objects of cultural patrimony are discovered on federal land, the provisions of the Native American Graves Protection and Repatriation Act will be followed as per the NAGPRA plan in Appendix K of the BLM's PA, if such a plan is required.

**BLM-CUL-9:** The Applicant will provide worker environmental awareness program (WEAP) training during construction to assist in worker compliance with cultural resource protection procedures. The training will include photographs of a variety of historic and prehistoric artifacts and will include a description of the specific steps to be taken in the event of an unanticipated discovery of cultural material, including human remains.

### 4.4.5 Residual Impacts after Mitigation Measures were Implemented

Residual impacts on cultural resources would exist after mitigation measures were implemented. Cultural resources damaged or destroyed by construction of the proposed action, even if subjected to mitigation, would be permanently lost from the archaeological record. This would make the cultural resources unavailable for future study to address future research needs when more advanced investigative techniques and methods of analysis might be available.

### 4.4.6 Unavoidable Adverse Impacts

The ground disturbance that would occur from the BSPP would result in unavoidable adverse impacts on cultural resources through damage and displacement of artifacts, loss of integrity of cultural resources, and changes in the settings of cultural resources inconsistent with their historic or traditional cultural values.

# 4.5 Impacts on Environmental Justice

## 4.5.1 Impact Assessment Methodology

In considering environmental justice in energy siting cases, this PA/FEIS uses a demographic screening analysis to determine whether a low-income and/or minority population exists within the potentially affected area. The potentially affected area consists of a six-mile radius beyond the site boundary and is consistent with air quality modeling of the range of a proposed action's air quality impacts.

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," directs Federal agencies to assess whether their actions have disproportionately high and adverse human health or environmental effects on minority and low-income populations. The Presidential memorandum accompanying the executive order states that "each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by NEPA." The demographic screening to determine the presence of minority and low income populations is based on information contained in two documents: *Environmental Justice: Guidance Under the National Environmental Policy Act* (Council on Environmental Quality, December, 1997) and *Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analyses* (U.S. Environmental Protection Agency, April, 1998). The screening process relies on Year 2000 U.S. Census data to determine the presence of minority and below-poverty-level populations.

In addition to the demographic screening analysis, this EIS follows the steps recommended by the U.S. EPA's guidance documents, which recommend outreach and involvement, and, if warranted, a detailed examination of the distribution of impacts on segments of the population.

The environmental justice analysis has reviewed the finding and analysis for the following 11 sections in the PA/FEIS: Air Quality, Hazardous Materials, Land Use, Noise, Public Health, Social and Economics, Soils and Water, Traffic and Transportation, Transmission Line Safety/Nuisance, Visual Resources, and Waste Management. In its review of each PA/FEIS section, the environmental justice analysis considered potential impacts and mitigation measures, significance, and whether there would result in a disproportionately high and adverse impact on an environmental justice population.

## 4.5.2 Discussion of Direct and Indirect Impacts

### Proposed Action

The minority population within both Census Block 458.00.6 and the City of Blythe as the whole are more than 50 percent and therefore both represent a community of concern for the purpose of environmental justice analysis. Census Block 458.00.6 also has a proportion of low-income residents living below the poverty level (28.3 percent), which is nearly twice that for Riverside

County as a whole. Consequently, it is conservatively judged that the Census Block Group 458.00.6 is also identified as a low income population that represents a community of concern for the environmental justice analysis. In addition, even though the residential population consists solely of the inmates at Chuckwalla and Iron Wood State Prisons, Census Block Group 458.00.3 is also recognized as a minority community of concern for the environmental justice analysis.

In the context of the siting of a fossil-fired power plant, the primary environmental justice issues typically would be potential air or water issues that could adversely affect the health of nearby populations. Other issues could be any potential residential or business displacements, and noise impacts on populations near the power plant or ancillary facilities.

The GSEP would not result in significant air quality impacts or impacts to surrounding communities from emissions of toxic air contaminants. The proposed action would not involve wastewater discharges that could affect drinking water supplies or other water bodies. As a result of the proposed design, mitigation measures, and the absence of sensitive receptors nearby, there would be no significant noise impacts. The proposed action would not displace any homes or businesses. For these reasons, the rural and remote character of the area, and the low population concentration near the site, the GSEP would not result in disproportionate adverse impacts on low-income and minority populations. Therefore, no environmental justice impacts would be associated with the proposed action.

### Alternatives

Under both action alternatives (Proposed Action and Reduced Acreage Alternative), the only difference with regard to direct and indirect impacts would be directly related to the total acreage of land disturbed within the site under each action alternative. Generally, resource impacts relating to any potential environmental justice impacts would be decreases based on the reduced acreage of the parcels for the reduced acreage alternatives. Therefore, no environmental justice impacts would be associated with the reduced acreage alternatives.

Generally, for the three No Action/No Project Alternatives, there would be no direct or indirect resource impacts relating to potential environmental justice impacts. Therefore, no environmental justice impacts would be associated with the three No Action/No Project Alternatives.

## 4.5.3 Discussion of Cumulative Impacts

No direct or indirect environmental justice impacts are expected to be associated with the proposed action and alternatives. Therefore, since there would be no direct or indirect environmental justice impacts, no cumulative environmental justice impacts would result.

## 4.5.4 Summary of Mitigation Measures

Given the absence of environmental justice impacts, no environmental justice mitigation measures are proposed.

## 4.5.5 Residual Impacts after Mitigation Measures were Implemented

No residual environmental justice impacts would occur.

## 4.5.6 Unavoidable Adverse Impacts

No unavoidable adverse environmental justice impacts would occur.

# 4.6 Impacts on Lands and Realty

## 4.6.1 Impact Assessment Methodology

The BLM Master Title Plats (MTPs) and Land & Mineral Legacy Rehost 2000 System (LR2000), which is an automated record system, were reviewed to obtain information related to pending and authorized uses on the lands potentially affected by the GSEP and its ancillary facilities. The BLM Washington Office and California State Office web sites provided additional information relating to corridor designations and solar study areas potentially affected by the proposed GSEP.

Impact assessment is based on known impacts relative to construction, operation, maintenance and decommissioning of rights-of-way and land use permits of all types on BLM-administered land.

## 4.6.2 Discussion of Direct and Indirect Impacts

### Proposed Action

There would be no impacts to existing authorized users as a result of the solar generating facility because the site would be on vacant desert land. Although there are numerous existing rights-of-way (ROWs) of record within and adjacent to the designated corridors, only a few would be affected by the GSEP. Any new authorization(s) would be issued "subject to" the rights of the existing ROW holders. Therefore, the Applicant would be required to mitigate any potential impact to the existing users at Applicant's expense. This would mean bearing all costs for relocating or modifying any facilities, such as power poles or conductors that might be necessary to accommodate the new use and by boring beneath any existing buried facilities to avoid impacts. This priority right attaches when a ROW is granted; subsequent grants of ROW would be issued subject to the rights of prior grants. Here, if and after the proposed ROW is granted for the GSEP, subsequent applicants would have to mitigate any impact of their proposals to the GSEP.

The proposed installation of a fiber optic cable would be attached to the gen-tie line and a required redundant fiber optic cable would be buried in a shallow trench along the same alignment as the road and gen-tie and gas lines, which would either cross over or bore under any existing authorized use.

#### *Impacts to Designated Corridors*

Potential impacts to the designated corridors could occur as a result of the overhead gen-tie power line and underground gas pipeline crossing the corridors on a nearly perpendicular alignment rather than following along the corridor path. Impacts to the corridors from the fiber optic line would be the same as either the power line or gas pipeline, depending on whether the cable is strung on the gen-tie line or buried in a shallow ditch. However, with today's technology, the impacts would be expected to be minimal, easily mitigated and would not preclude continued and

future use of either designated corridor. Future use would be slightly constrained by placement of additional facilities within the corridors.

Impacts from the access road exiting Wiley's Well Road and heading west to the GSEP would be minimal because future transmission lines, both gas and electric, could easily bore under or span across the road, respectively. Future use would be slightly constrained by placement of additional facilities within the corridors.

### *Impacts to Interstate 10*

Potential impacts to Interstate 10 from the overhead gen-tie line (and fiber optic cable if strung on the gen-tie line) would be mitigated by following the requirements of the California Department of Transportation (CalTrans) and industry standards (SOPs) and best management practices (BMPs) for crossing highways. Potential impacts to I-10 from the underground pipeline (and fiber optic cable, if buried) would also be mitigated by implementing the requirements of the Federal Highway Administration (FHA), CalTrans and SOPs and BMPs for crossing under highways.

### *Impacts to Other Authorized Uses*

There would be no impacts to existing uses from the proposed solar generating facility.

As proposed, the gen-tie line would cross multiple existing uses both north and south of I-10. Once across the highway, the line would connect to the Blythe Transmission line which would eventually interconnect with the planned Colorado River substation.

The gas pipeline, as proposed, would connect directly into an existing east-west running Southern California Gas (SCG) gas pipeline causing a direct impact. The pipeline could indirectly impact other buried utilities that the pipeline would cross north and south of I-10. However, the pipeline would follow SOPs and BMPs for connection of one gas line to another and would be buried at a depth that would avoid all existing buried gas lines, therefore mitigating potential negative impacts to existing authorized users.

Potential impacts from the fiber optic cable would be the same as either the overhead power line or buried gas line, depending on whether the cable is strung on the gen-tie line or buried in a shallow trench beside the access road.

Potential impacts from the new access road that would exit Wiley's Well Road and head west to the GSEP boundary would be mitigated by following requirements of the FHA, CalTrans and SOPs/BMPs for encroachment of state highways.

## Alternatives

### *Reduced Acreage Alternative*

The Reduced Acreage Alternative would have a net generating capacity of approximately 125 MW and would occupy approximately 900 acres of land. This alternative would retain

50 percent of the proposed GSEP's generating capacity, and would affect 50 percent of the land affected by the proposed GSEP. The alternative would retain the Unit 1 solar field, including the construction parking, construction trailers, and temporary construction laydown area; the administration building and warehouse; the solar collector assembly area; the western evaporation pond area (approximately 24 acres); and the land farm area (approximately 10 acres). The alternative would require relocating the switchyard, from the Unit 2 power block to the Unit 1 power block. Similar to the proposed GSEP, the Reduced Acreage Alternative would transmit power to the grid through the Colorado River Substation. It would require infrastructure including groundwater wells, a transmission line, road access, an administration building, and evaporation ponds. The required infrastructure and transmission line for the Reduced Acreage Alternative would follow the routes defined for the proposed GSEP, even though Unit 2 would not be constructed. The linear facilities would require approximately 90 acres.

Overall impacts would be largely the same. The length of the transmission line for collecting and carrying power to the on-site substation would be slightly reduced. The off-site transmission line, fiber optic cable, gas pipeline, and road access would be extended approximately 1 mile in length to the site, although they would cross into and over the corridors and connect into the existing gas and power lines in the same location as the proposed GSEP.

### *Dry Cooling Alternative*

Dry cooling is being evaluated as an alternative to wet cooling for the proposed GSEP. The dry cooling alternative would use the same footprint as the proposed GSEP alternative.

Overall impacts to existing uses would be largely the same as with the proposed GSEP. There are no existing uses authorized within the footprint of the solar facility. The length of transmission lines for collecting and carrying power to the on-site substation would be the same. The off-site transmission line, gas pipeline and access road to the site would also be the same as with the proposed GSEP.

### *No Action Alternative A*

Under this No action alternative, the ROW application would be denied, and the ROW grant would not be authorized. The CDCA (1980, as Amended) would not be amended.

Impacts associated with the GSEP would likely only be delayed by selecting No Action Alternative A since this region of the United States has extremely positive characteristics for solar power generation. If this GSEP were not approved, another application for a different solar generating facility, or a different type of solar generating facility, would likely be filed at some time in the near future. The various solar energy technologies require the use of different amounts of land. Depending on the type of facility, the amount of acreage needed could be less, approximately the same, or larger than the proposed GSEP. Additionally, an application could also be filed for a wind energy facility or any other kind of use, and impacts would result based on the size and specific use requested.

### *No Project Alternative B*

Under this No Project alternative, the ROW application would be denied, and the ROW grant would not be authorized. The BLM would amend the CDCA Plan to make the proposed site unavailable for future solar energy development. As a result, no solar energy project would be constructed on the GSEP site.

Impacts resulting from the proposed GSEP would not occur under No Project Alternative B. However, the land would remain open to other types of rights-of-way and/or land use authorizations, resulting in impacts specific to a future use other than solar energy generation.

### *No Project Alternative C*

Under this No Project alternative, the ROW application would be denied and the ROW grant would not be authorized. The CDCA (1980, as Amended) would be amended to identify the GSEP application area as suitable for any type of solar energy development.

Impacts associated with the proposed GSEP would likely only be delayed by selecting No Project Alternative C since this region of the United States has extremely positive characteristics for solar power generation. If this GSEP were not approved, another application for a different solar generating facility or a different type of facility would likely be filed at some time in the near future. The various solar energy technologies require the use of different amounts of land. Depending on the type of facility, the amount of acreage needed could be less, approximately the same or larger than the proposed GSEP. This No Project Alternative potentially could result in the conversion of acreage upwards to the amount of the proposed GSEP or possibly even a larger amount of land.

## 4.6.3 Discussion of Cumulative Impacts

Impacts resulting from construction, operation, maintenance and decommissioning of the GSEP could result in a cumulative effect on lands and reality with other past, present, or reasonably foreseeable future actions. The geographic scope of the cumulative effects analysis for lands and realty consists of eastern Riverside County, based on the jurisdictional boundaries within which the impacts of land use decisions of the proposed action and other projects could be additive, countervailing or synergistic. Potential cumulative effects on lands and realty could occur during the GSEP's proposed 39-month construction period if, for example, it would be necessary to relocate or modify existing facilities within a ROW. Potential cumulative effects on lands and realty could also occur during the projected 30 year lifespan of the proposed action if, for example, future projects were constrained by the placement of GSEP-related facilities or are located within designated corridors. Potential cumulative effects on lands and realty could also occur during closure and decommissioning activities.

Existing conditions within the cumulative impacts area reflect a combination of the natural condition and the effects of past actions and are described in PA/FEIS Chapter 3. Direct and indirect effects of the construction, operation and maintenance, and closure and decommissioning of the GSEP are analyzed above. Past, present and reasonably foreseeable future actions making

up the cumulative scenario are identified in Section 4.1. Among them, other ROW applications for linear and non-linear projects could be developed in eastern Riverside County include other utility-scale solar projects and the proposed Eagle Crest Pump Storage project, and Associated Gen-tie Trans Lines. Additional actions that could have cumulative impacts include, among others, substation projects, Eagle Mountain Landfill, and activities in OHV areas and LTVAs. ROW grants and other land use decisions associated with these actions and projects would affect the nature, type, and intensity of uses authorized on the lands potentially affected by the GSEP and its ancillary facilities. They also would affect the amount of land within the cumulative impacts area that would be available for other uses.

Multiple ROW applications are pending in the vicinity of the GSEP. Based on the interconnection applications for the transition cluster participants, the Applicant would build a double-circuit 230 kV line to carry the GSEP site's 250 MW project on one circuit and Solar Reserve's 150 MW on the second circuit; the Solar Millennium, LLC and Chevron Energy Solutions would build a double-circuit 230 kV line carrying 1,000 MW from the Blythe Solar Power Project site; and enXco would build a double-circuit 230 kV transmission path through the GSEP site to support its McCoy development efforts north of the Genesis-McCoy site.

BLM's general policy is to review ROWs in the order in which they are received. However, each of the pending applications would be for a project on BLM land and it is in BLM's interest to have utilities on its property co-located in common utility corridors.

Two sets of policies bear on this issue (RSA 2010). First, it is the policy of the Western Electricity Coordinating Council (WECC) to separate adjacent transmission lines with a distance that is equal to or greater than the longest span length of the transmission lines in question, which in this case is approximately 900 feet. WECC is a regional entity responsible for promoting and coordinating bulk electric system reliability in the western United States (WECC 2010). Second, California Independent System Operator (CAISO) policies specify the maximum amount of power that can be interrupted (to avoid exceeding the single largest risk to the ISO controlled system) as follows:

1. 1,150 MW of capacity can be interrupted under a single contingency (i.e. one transmission line or circuit, one transformer bank, etc.)

2. 1,400 MW of capacity can be interrupted under a double contingency (i.e. two transmission lines or circuits (including two circuits on a single tower), two transformer banks, etc.)

The CAISO operates the energy grid, provides fair and open transmission access, and promotes environmental stewardship and infrastructure development (CAISO 2010). Of these two sets of policies, the WECC transmission line separation criterion appears most likely to constrain efforts to accommodate connectivity of the other proposed actions.

The connectivity of future applicants also could be accommodated consistent with BLM interests by using an existing two-mile wide utility corridor (designed in the CDCA Plan as "Planned Utility Corridor J") that is located east of the GSEP site and along California's eastern border, from the Arizona-California-Mexico border to its end, just west of Parker, Nevada. There remains

sufficient capacity within Corridor J to accommodate up to 50 new transmission or gas lines and/or expansion of existing uses.

Cumulative impacts would vary by alternative only to the degree to which direct and indirect impacts vary by alternative.

## 4.6.4 Summary of Mitigation Measures

Compliance with industry SOPs and BMPs would avoid or mitigate potential safety and land use inconsistency issues related to the type of facilities proposed. SOPs and BMPs designed and adopted by the power industry would be followed to reduce or eliminate potential problems that might result from the gen-tie line crossing I-10 and existing power lines north and south of the highway. Additionally, SOPs and BMPs developed and adopted by the gas industry would be followed to ensure the public safety and continued safe operations of any underground power or gas lines the four inch gas line would cross. The SOPs and BMPs designed and adopted by the FHA and Caltrans provide for utilities to cross highways safely to protect the traveling public. Likewise, the SOPs and BMPs that would be tied to an encroachment permit from Caltrans for access from Black Rock Road to the site would ensure that the public safety would be protected during and after construction.

## 4.6.5 Residual Impacts after Mitigation Measures were Implemented

There would be no known residual impacts to existing authorized uses.

## 4.6.6 Unavoidable Adverse Impacts

Approval of a solar energy generation project would result in the land not being available for other uses during the life of the GSEP. However, once the GSEP is no longer viable and is decommissioned, the land would be available for other uses in the future, depending on the condition of the land and the use proposed.

# 4.7 Impacts on Mineral Resources

## 4.7.1 Impact Assessment Methodology

Applicable geologic maps and reports for this area (CDC 2000; CDC 2001; CDMG 1967; CDMG 1968; CDMG 1990; CDMG 1994a; CDMG 1998; CDMG 1999; McCleod, 2009; Kleinfelder 2009; USGS 2006; and USGS 2009b) were reviewed. The proposed GSPP is currently not used for mineral production, nor is it under claim, lease, or permit for the production of locatable, leasable, or salable minerals/mineral materials. The GSPP should not have a significant impact on the availability of such resources.

The proposed GSEP site is mapped as Mineral Resource Zone (MRZ)-4 (CDMG 1994a). The designation MRZ-4 refers to, "areas of no known mineral occurrences where geologic information does not rule out either the presence or absence of industrial mineral resources." No economically viable mineral deposits are known to be present at the site (CDMG 1994a; Kohler 2006). Many inactive mines and mineral prospects are hosted by in metamorphic and intrusive basement rocks within 10 miles of the proposed GSEP boundaries and GSEP linears. These have produced a number of precious and base metals, including iron (magnetite) from the Iron King, Iron Queen and Iron Cap mines in the Palen Mountains1½ to the north (CDMG 1994a). Minor gold, silver, copper and uranium prospects are located in the Palen Mountains 2½ miles to the north, and in the McCoy Mountains 4½ miles to the east. The Roosevelt and Hodge Mining Districts produced gold and silver from quartz veins and shear zones in the Mule Mountains approximately 6 to 9 miles southeast of the proposed GSEP linears. Pyrophyllite, an industrial mineral used in the manufacturing of dry lubricants, paper, rubber, fabric and soap, has been mined from the Palen Mountains 3½ miles north of the site. Several borrow pits are present along Interstate 10. No mines are known to have existed within the proposed GSEP boundaries (USGS 2008b).

## 4.7.2 Direct and Indirect Impacts

There are no active mining claims, mineral leases or mineral materials disposal permits within the GSEP area. There would be no direct or indirect impacts to locatable or leasable minerals. Mineral materials are present at the site. However there are suitable materials throughout the area. Therefore, there would be no direct impacts to the availability and development of mineral materials resources within or near the GSEP area.

The southern part of the GSEP area and surrounding area are prospectively valuable for geothermal resources, and sodium and potassium. The GSEP would limit the development of geothermal resources, and sodium and potassium within the GSEP area.

### Alternatives

There would be no difference in the direct or indirect impacts of the proposed action, or any of the proposed alternatives.

## 4.7.3 Cumulative Impacts

Because the proposed action and alternatives would have no direct or indirect effects on mineral resources, no cumulative effects analysis is required or provided for this resource.

# 4.8 Impacts on Multiple Use Classes

## 4.8.1 Impact Assessment Methodology

The Multiple Use Class (MUC) Guidelines in Table 1 of the CDCA (BLM 1980, as amended) provide that solar electrical generation facilities may be allowed in MUC Limited (L), Moderate (M), and Intensive (I) areas after NEPA requirements are met.

## 4.8.2 Discussion of Direct and Indirect Impacts

The proposed action would be developed entirely within MUC-M. The total acreage of the Moderate MUC that would be affected by construction of the solar facility under the proposed action would be roughly 1,800 acres. No changes in the MUC classification would be required prior to approving the ROW grant. Nonetheless, approval of the ROW grant would restrict multiple use opportunities on the GSEP site to a single dominate use for the anticipated 30-40 year lifespan of the proposed action. This restriction would be lifted upon closure and decommissioning of the proposed action; thereafter, use opportunities on the site would return to the pre-GSEP conditions discussed in FEIS Chapter 3.

### Alternatives

#### *Reduced Acreage Alternative*

Like the Proposed Action, the Reduced Acreage Alternative would be developed entirely within MUC-M lands. Potential direct and indirect impacts on lands designated MUC-M would be the same as for the proposed action. The total acreage of the MUC-M lands that would be affected by construction of the Reduced Acreage Alternative would be 900 acres.

#### *Dry Cooling Alternative*

Like the Proposed Action, the Dry Cooling Alternative would be developed entirely within MUC-M lands. Potential direct and indirect impacts on lands designated MUC-M would be the same as for the proposed action. The total acreage of the MUC-M lands that would be affected by construction of the Dry Cooling Alternative would be roughly 1,700 acres.

#### *No Action Alternative A*

If the No Action Alternative A were selected, impacts associated with the proposed action would not occur because no use opportunities would be foreclosed. However, other utility-scale solar power facilities could be built, which would result in the same impact on MUC-M by this alternative that the proposed action would cause.

#### *No Project Alternative B*

If the No Project Alternative B were selected, the proposed GSEP would not be approved by the BLM, and the BLM would amend the CDCA Plan to make the proposed site unavailable for

future solar development. As a result, no solar energy project would be constructed on the site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Plan. No use opportunities otherwise allowable on MUC-M designated land would be foreclosed.

### *No Project Alternative C*

If the No Project Alternative C were selected, the proposed GSEP would not be approved by the BLM, and BLM would amend the CDCA Plan to allow for other solar projects on the site. The development of another solar energy project on the site would result in the same foreclosure of use opportunities that would result from the proposed action.

## Land Use Plan Amendment Analysis

The proposed land use plan amendment to be made by the BLM is a Site Location Identification decision only. The proposed solar project and all of its alternatives are located within Multiple Use Class M lands. The classification designations govern the type and degree of land-use action allowed within the classification area. All land use actions and resource-management activities on BLM-administered lands within a multiple-use class delineation must meet the guidelines for that class. These guidelines are listed on Table 1, Multiple Use Class Guidelines, to the CDCA Plan of 1980 (at page 15). Multiple use class M allows electric generation plants for solar facilities after NEPA requirements are met. The specific application of the multiple use class designations and resource management guidelines for a specific resource or activity are further discussed in the plan elements section of the CDCA Plan. In Class M designations, the authorized officer is directed to use judgment in allowing for consumptive uses by taking into consideration the sensitive natural and cultural values that might be degraded.

The proposed Site Location (Site) for the proposed project, the Reduced Acreage Alternative, the Dry Cooling Alternative, the No Action Alternative A, and the No Project Alternatives B and C, meets the Multiple Use Class Guidelines as noted in the CDCA Plan for the resources listed below.

For purposes of this discussion, No Action Alternative A, as well as No Project Alternatives B and C, are considered herein as being one and the same and are therefore referred to as “No Action Alternatives” since none precludes development of any kind on the Site (although No Action Alternative B would make the land unavailable for a solar development facility, it would not preclude other types of development). Additionally, the terminology “proposed project and alternatives” is used herein since the Site is the same for the proposed project, the Reduced Acreage Alternative, the Dry Cooling Alternative and the No Action Alternatives.

1. *Agriculture:* Agricultural uses of Class M lands are not allowed, with the exception of livestock grazing. The site is not currently used for agriculture, and the proposed project and alternatives would not involve use of the site for agriculture.

2. *Air Quality:* Class M lands are to be managed to protect air quality and visibility in accordance with Class II objectives of Part C of the Clean Air Act as amended. The

anticipated maximum emissions that would be associated with the proposed project are provided in Table 4.02-6 for construction and Table 4.02-7 for operations. The analysis indicates, with the exception of PM10 impacts, that the proposed GSEP would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. The emissions associated with the Reduced Acreage would be lower than those of the proposed project. For the Dry Cooling Alternative, there would be a slight increase for the other criteria pollutants from those for the proposed GSEP as shown in Table 4.02-7. There would be no emissions associated with the No Action Alternatives. Therefore, all of the alternatives would conform to the Class II objectives referenced in the CDCA Plan guidelines.

3. *Water Quality:* Class M lands are to be managed to provide for the protection and enhancement of surface and groundwater resources, and BMPs are to be used to avoid degradation and to comply with Executive Order 12088. Section 4.19 of this EIS evaluated the proposed project and alternatives, for groundwater use conflicts, the potential to impact groundwater quality, and the potential to impact surface water resources. Although BLM has not established BMPs for solar projects, the agency has reviewed, and agrees with the implementation of the BMPs that would be associated with the proposed project and its alternatives. These BMPs have been derived from a variety of sources, including those proposed by the applicant, those required by the Energy Commission through its Conditions of Certification, and those required for compliance with other state and Federal laws designed to protect water resources. Implementation of these BMPs, and BLM's standard term and condition requiring compliance with other Federal, state, and local regulations, would constitute compliance with Executive Order 12088. The measures would be applicable to all project alternatives, and would therefore conform to the guidelines in Table 1 of the CDCA Plan.

4. *Cultural and Paleontological Resources:* Cultural and paleontological resources will be preserved and protected. Procedures described in 36 CFR 800 will be observed where applicable. As described in detail in Sections 4.3 and 4.10, impacts on cultural and paleontological resources resulting from the development and operation of the proposed project, Reduced Acreage Alternative, and Dry Cooling Alternative would be mitigated, and therefore all three alternatives would conform to the MUC Guidelines. Adverse effects on cultural resources listed on or determined eligible for the National Register of Historic Places will be resolved in accordance with a Programmatic Agreement being prepared for the project in consultation with the California State Historic Preservation Officer, Indian tribes and other interested parties in accordance with Section 106 of the National Historic Preservation Act. Identification of the site location for the proposed action or any of the alternatives is subject to the MUC Guidelines for cultural and paleontological resource protection as is evidenced by the applicability of the guidelines to the specific facility proposal. As such, all of the site locations and the site location alternatives are within the MUC Guidelines for cultural and paleontological resource protection established by the CDCA Plan.

5. *Native American Values:* Native American cultural and religious values will be protected and preserved with appropriate Native American groups consulted. Consultation with Indian tribes was initiated at the earliest stages of project planning and will continue during the NEPA compliance process. Opportunities have been provided to allow Indian tribes to identify places and resources of importance to them and to express concerns regarding cultural and religious values that could be impacted by the proposed action and alternatives.

Adverse effects on any places of traditional cultural or religious importance that are identified by tribes will be resolved in accordance with the Programmatic Agreement being developed for the project with tribal participation. Therefore, cultural guidelines with respect to requirements for consultation have been met. In addition, the protection of cultural resources as discussed in Section 4.3 ensures that preservation and protection of Native American cultural and religious values associated with cultural resources is accomplished in accordance with the CDCA Plan MUC Guidelines.

6. *Electrical Generation Facilities:* Solar generation may be allowed on Class M lands after NEPA requirements are met. The analysis contained in the EIS, which addresses the proposed action and its alternatives, comprise the NEPA compliance required for this MUC guideline.

7. *Transmission Facilities:* New gas, electric and water transmission facilities and cable for interstate communication may be allowed only within designated corridors. NEPA requirements will be met. The proposed action and alternatives described for the GSEP meets this guideline by locating the gen-tie connection to the interstate transmission system within an existing designated ROW corridor.

8. *Communication Sites:* Communication sites may be allowed on Class M lands after NEPA requirements are met. The proposed project and alternatives, would not involve installation of communications sites.

9. *Fire Management:* Fire suppression measures in Class M areas will be taken in accordance with specific fire management plans, subject to such conditions as the authorized officer deems necessary. The project area is within the area covered by the Fire Management Activity Plan (FMAP) 1996 for the California Desert developed by the National Park Service and BLM. The FMAP brings together fire management goals for biological resources, wilderness, and other sources and establishes fire management standards and prevention and protection programs. The FMAP includes limitations on fire suppression methods in critical habitat and other tortoise habitat; the limitations are designed to limit habitat disturbance while keeping fires small. While the FMAP addresses management and suppression of wildfires, it does not address incidents on specific facilities such as power plants. The applicant has developed fire suppression measures that would be used for the proposed project and alternatives, and these measures are discussed in Section 4-23. The Project applicant would be required to install a fire protection/control system on site including a fire water supply system and associated infrastructure, and to comply with state and federal regulations regarding worker safety and training. Additionally, the applicant would be required to provide funding to the Riverside County Fire Department to ensure available resources to fight potential fires on site. However, the specific fire management plan is not relevant to the types of fires that would be addressed by the applicant. Should a fire occur in the area that is not specific to the facility, it would be addressed by BLM, not by the applicant, and it would be addressed in conformance with the Fire Management Plan, and therefore, would conform to the guideline for Fire Management for this multiple use class.

10. *Vegetation:* Table 1 of the CDCA Plan includes a variety of guidelines associated with vegetation as follows:

Native Plants – Commercial or non-commercial removal of native plants in Class M areas may be allowed only by permit after NEPA requirements are met, and after development of necessary stipulation. Approval of a ROW grant for the propose project and alternatives would constitute the permit for such removal. The BMPs in the FEIS and conditions of approval that would be required in a Record of Decision would constitute the stipulations to avoid or minimize impacts from removal of native plants.

Harvesting of plants by mechanical means – Harvesting by mechanical means is also allowed by permit only. Although the proposed project and its alternatives would include the collection of succulents and seeds to assist with reclamation, the removal of these items would not be done for distribution to the public. Also, the guidelines for vegetation harvesting include encouragement of such harvesting in areas where the vegetation would be destroyed by other actions, which would be the case with the proposed project and alternatives. Therefore, the proposed project and alternatives would be in conformance with this MUC guideline.

Rare, Threatened, and Endangered Species, State and Federal – In all MUC areas, all state and federally listed species will be fully protected. In addition, actions which may jeopardize the continued existence of federally listed species will require consultation with the U.S. Fish and Wildlife Service. As evaluated in Section 4.17, no federally or state listed plants would be impacted by the proposed project and alternatives.

Sensitive Plant Species – Identified sensitive plant species would be given protection in management decisions consistent with BLM's policy for sensitive species management, BLM Manual 6840. The objective of this policy is to conserve and/or recover listed species, and to initiate conservation measures to reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing. One BLM sensitive plant, Harwood's eriastrum (= Harwood's woollystar), was identified in the GSEP area, and impacts and mitigation associated with this species were discussed in Section 4-17. In an effort to protect this species, BLM worked with the applicant and the Energy Commission to develop mitigation to reduce the number of individuals of the species that would be affected. Because these measures are intended to reduce threats to this species to minimize the likelihood of listing, these measures are in conformance with the MUC guidance in the CDCA Plan.

Unusual Plant Assemblages (UPAs) – No UPAs have been identified on the site of the proposed project and alternatives.

Vegetation Manipulation – Mechanical control may be allowed after consideration of possible impacts. Vegetation manipulation is defined in the CDCA Plan as removing noxious or poisonous plants from rangelands; increasing forage production; creating open areas within dense brush communities to favor certain wildlife species; or eliminating introduced plant species. Applicant would finalize the draft site-specific weed management plan prior to a ROW grant being issued. Such actions would be conducted as part of the proposed project and alternatives. Weed management under the weed management plan would conform to Federal, State, and local regulations, so would be allowed. Therefore, each alternative would conform to the guidelines.

11. *Land Tenure Adjustment:* Class M land may be sold in accordance with FLPMA and other applicable Federal laws and regulations. The proposed project and alternatives would not involve sale of any BLM-administered lands.

12. *Livestock Grazing:* Livestock grazing is allowed subject to the protection of sensitive resources. The proposed project and alternatives would not involve the livestock grazing on Class M lands.

13. *Minerals:* The proposed project and alternatives would not involve the development of minerals on Class M lands.

14. *Motorized Vehicle Access/Transportation:* Pursuant to the CDCA LUP guidelines for Class M areas, motorized-vehicle use is allowed on "existing" routes of travel unless closed or limited by the authorized officer, and new routes may be allowed upon approval of the authorized officer. Issuance of a ROW grant would constitute approval of the authorized officer. In areas designated as limited use area for OHV use, changes to the transportation network (new routes, re-routes, or closures) in "limited" areas may be made through activity-level planning or with site-specific NEPA analysis (IM 2008-014). Modifications to area OHV designations (open, closed, or limited) require amendment to the RMP. There are no area OHV designations that are being made or modified through the proposed action or any of the alternatives. This activity falls within the CDCA LUP guideline noted above.

15. *Recreation:* The proposed project and alternatives would not involve use of the proposed project or alternative sites for recreational uses.

16. *Waste Disposal:* The proposed project and alternatives would not involve the development of waste disposal sites on the proposed project or alternative sites.

17. *Wildlife Species and Habitat:* Table 1 of the CDCA Plan includes a variety of guidelines associated with wildlife as follows:

> Rare, Threatened, and Endangered Species, State and Federal – In all MUC areas, all state and federally listed species and their critical habitat will be fully protected. In addition, actions which may jeopardize the continued existence of federally listed species will require consultation with the U.S. Fish and Wildlife Service. As discussed in Section 4-21, Wildlife Resources, the desert tortoise, which is listed as federally and state threatened, would be affected by the proposed project and alternatives. All of the action alternatives would affect a small portion of critical habitat. As specified in the guideline, BLM has initiated formal consultation with the U.S. Fish and Wildlife Service in accordance with Section 7 of the Endangered Species Act. BLM has worked with the Energy Commission, USFWS, CDFG, and applicant to develop protection and compensation measures for the desert tortoise, which include stringent avoidance measures, the full level of compensation required by USFWS for this category of tortoise habitat, and enhancement and protection measures in other areas. Therefore, the proposed project and its alternatives would comply with the guideline to provide full protection to the species.
>
> Sensitive Species – Identified species would be given protection in management decisions consistent with BLM's policy for sensitive species management, BLM Manual 6840. The objective of this policy is to conserve and/or recover listed

species, and to initiate conservation measures to reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing. Several BLM sensitive wildlife species (other than the desert tortoise, identified and discussed in the previous paragraph) present or likely to occur on habitat associated with the proposed project and alternatives include, but are not limited to, Couch's spadefoot toad, Mojave fringe-toed lizard, western burrowing owl, golden eagle, LeConte's thrasher, several species of bats, Nelson's bighorn sheep, desert kit fox and American badger. Those species that are likely to occur on the proposed project and alternatives would be protected under a number of mitigating measures meant to avoid, minimize, or compensate for impacts from the project as discussed in detail in Appendix G of this FEIS.

The proposed project and alternatives, including the mitigation measures associated with these actions, would involve habitat manipulation to improve habitat (such as tortoise fencing along roads and project) and introduction of native species (through the translocation of tortoises). Introduction of native species is permitted in Class M areas, and habitat manipulation is allowed subject to environmental assessment, as is done within this EIS. Therefore, the proposed project and its alternatives would be in conformance with these guidelines.

The proposed project and alternatives, including the translocation associated with these actions, may involve the control of depredation of ravens. Therefore, this guideline is applicable to these actions but is allowed subject to conformance with state and federal laws in MUC M.

18. *Wetland/Riparian Areas:* No wetlands or riparian areas are present on the site of the proposed project and alternatives.

19. *Wild Horses and Burros:* No wild and free-roaming horses or burros are present on the site of the proposed project and alternatives.

## 4.8.3 Discussion of Cumulative Impacts

The geographic scope of the cumulative effects analysis for multiple use classes would include CDCA Plan area lands designated MUC-M. This geographic scope was established based on the boundaries of the affected resource. Potential cumulative impacts could result from construction of the proposed action and, to the extent they exist, would continue until closure and decommissioning is complete, because this is the period of time during which the existence of the proposed action would preclude the development of other uses on the site and, thereby, affect the type of use opportunities on MUC-M lands throughout the CDCA Plan area.

Existing conditions within the cumulative impacts area reflect a combination of the natural condition; MUC-M use opportunities presently being exercised; and, where such opportunities are not currently are being exercised, the flexibility to elect to pursue one or more among them at some point in the future. The effects of past actions are reflected in the discussion in FEIS Chapter 3. Effects of the GSEP on MUCs, as analyzed above, essentially relate to opportunity cost: if the GSEP or an alternative is developed on the site, the site cannot be used for use opportunities that otherwise would be available on the site. Past, present and reasonably

foreseeable future actions making up the cumulative scenario are identified in Section 4.1. Among them, any projects that also would be developed on lands designated for MUC-M uses would similarly restrict available use opportunities within that classification for the duration of those projects. Any cumulative impact on multiple uses classes that could be caused by any of the action alternatives, No Action Alternative A or No Project Alternative C would be the same as for the proposed action. By contrast, because No Project Alternative B would not limit the multiple use opportunities that presently area available on the site, No Project Alternative B would not contribute to any cumulative impact on multiple use classes.

## 4.8.4 Summary of Mitigation Measures

No mitigation measures are required.

## 4.8.5 Residual Impacts after Mitigation Measures were Implemented

There would be no known residual impacts to existing authorized uses.

## 4.8.6 Unavoidable Adverse Impacts

Approval of the ROW grant would have the effect of limiting current multiple use opportunities of the facility footprint area to a single dominate use for the life of the project.

# 4.9 Impacts on Noise

## 4.9.1 Impact Assessment Methodology

Noise impacts associated with the project can be created by short-term construction activities and by normal long-term operation of the power plant. The Applicant provided noise level estimates that serve as the basis of this analysis. However, the Applicant did not perform full noise modeling for construction and operation of the proposed action because there are no noise sensitive receptors within 9 miles of the GSEP site (GSEP 2009a; RSA 2010).

## 4.9.2 Discussion of Direct and Indirect Impacts

### Construction

Construction of the GESP is expected to occur over a period of 37 months (GSEP 2009a). Each unit of the GSEP is expected to require approximately 25 months to be constructed, with the construction of each unit overlapping by 12 months.

Construction of an industrial facility such as a power plant is typically noisier than permissible under usual noise ordinances. In order to allow the construction of new facilities, construction noise during certain hours of the day is commonly exempt from enforcement by local ordinances.

The Applicant has predicted that there will be no noise impacts due to GSEP construction on the nearest sensitive receptors (GSEP 2009a). Assuming an average construction noise of 93 dBA $L_{eq}$ at 50 feet from the noise center (the upper range of noise levels for construction equipment), GSEP construction noise would attenuate to 39 dBA at a distance of five miles from the acoustic center. GSEP construction noise would further attenuate to 34 dBA at the state prison, 9 miles away.

There are no LORS that limit construction noise levels for the GSEP. The Riverside County Code prohibits noisy construction work to daytime hours when a project is within one-quarter mile of a noise sensitive receptor. Given the distance between the proposed GSEP site and the nearest noise sensitive receptor, this limitation does not apply. No limit on construction hours needs to be enforced for the GSEP.

Construction activities would result in a temporary, although relatively long-term (37 months) increase in the ambient noise level. Animals rely on hearing to avoid predators, obtain food, and communicate. Excessive construction noise could interfere with normal communication, potentially interfering with maintenance of contact between mated birds, obscuring warning and distress calls that signify predators and other threats, and affecting feeding behavior and protection of the young. High noise levels may also render an otherwise suitable nesting area unsuitable. Behavioral and physiological responses to noise and vibration have the potential to cause injury, energy loss (from movement away from noise source), a decrease in food intake, habitat avoidance and abandonment, and reproductive losses (Hunsaker 2001; National Park Service 1994).

Studies have shown that noise levels over 60 A-weighted decibels (dBA) can result in nest abandonment by birds and intense, long-lasting noise can mask bird calls, which can reduce reproductive success (Dooling and Popper 2007; Hunsaker 2001). Noise impact studies on bighorn sheep have not identified numerical noise impact thresholds. Weisenberger (1996) found that bighorn sheep responded to aircraft over-flights (92-112 dBA) with increased heart rates and altered behavior; however, animal response decreased with increased exposure.

Assuming an average construction noise of 93 dBA at 50 feet from the noise center (the upper range of noise levels for construction equipment), project construction noise would attenuate to 39 dBA at a distance of five miles from the noise center (GSEP 2009a). Using sound extrapolation, project construction noise should attenuate to 60 dBA at approximately 2,300 feet (0.43 mile) from the noise center of construction activities (Bright pers. comm.).

The majority of the construction activities would occur within the powerblocks located approximately 3,200 feet (0.6 mile) from the GSEP boundary. Therefore, it is anticipated that construction noise levels would typically be less than 60 dBA in the Palen/McCoy Wilderness Area and surrounding the GSEP site. The infrequent occasions when construction activities would occur near the GSEP boundary and resultant noise levels would be temporarily elevated beyond 60 dBA surrounding the GSEP would not significantly impact sensitive wildlife.

### *Vibration*

The only construction activity likely to produce vibration that could be perceived off site would be pile driving, should it be employed. Vibration attenuates rapidly; it is likely that no vibration would be perceptible at any appreciable distance from the GSEP site.

## Operation and Maintenance

The majority of operational noise would originate from the power blocks, which would be roughly centered at each site and surrounded by solar fields; this creates a buffer for noise to attenuate before reaching the GSEP property boundary and the Palen/McCoy Wilderness Area. Other minor operational noise sources include mirror rotation and maintenance activities (e.g., mirror washing). Excessive noise could disrupt the nesting, roosting, or foraging activities of sensitive wildlife. The Palen/McCoy Wilderness Area, immediately north of the proposed GSEP, is an especially noise-sensitive biological receptor.

Because the proposed GSEP is located more than nine miles from a human noise-sensitive receptor, the applicant determined that a full acoustic modeling analysis of GSEP operations was not warranted (GSEP 2009a). However, data provided for nearby proposed solar projects of similar size and technology (i.e., Palen and Blythe Solar Power Projects) serve as a proxy for anticipated operational noise levels of the GSEP. As such, operational noise is expected to typically range from 90dBA and for certain equipment to approximately 50 to 60 dBA at greater linear distances from the power generation equipment (GSEP 2009a).

One possible source of disturbance would be strong tonal noises. Tonal noises are individual sounds (such as pure tones) that, while not louder than permissible levels, stand out in sound quality. The applicant plans to avoid the creation of annoying tonal (pure-tone) noises by balancing the noise emissions of various power plant features during plant design. Given the lack of noise sensitive receptors within the vicinity of the GSEP, tonal noises would not be expected to cause annoyance.

### *Vibration*

Vibration from an operating power plant could be transmitted by two chief means; through the ground (groundborne vibration) and through the air (airborne vibration).

The operating components of the GSEP consist of a high-speed steam turbine generator and various pumps and fans. All of these pieces of equipment must be carefully balanced in order to operate; permanent vibration sensors are attached to the turbines and generators. Ground borne vibration from GSEP would be undetectable at distances greater than a few hundred feet from the power block (RSA 2010). Given that there are no receptors within nine miles of the project, vibration would not have an impact on any receptors.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves and can rattle the walls of lightweight structures. None of the project equipment is likely to produce low frequency noise; this makes it highly unlikely that GSEP would cause perceptible airborne vibration effects.

## Linear Facilities

Linear facilities include a new six-mile natural gas pipeline connecting to an existing Southern California Edison pipeline located north of highway I-10, as well as new electrical transmission lines interconnecting to the transmission system to the southeast of the GSEP site. Both the natural gas pipeline and the transmission lines would extend past the GSEP site boundaries; neither would pass close to noise sensitive receptors (GSEP 2009a, AFC Figure 5.12-1).

## Steam Blows

Typically, the loudest noise encountered during construction, inherent in building any project incorporating a steam turbine, is created by the steam blows. After erection and assembly of the feedwater and steam systems, the piping and tubing that comprises the steam path has accumulated dirt, rust, scale and construction debris such as weld spatter, dropped welding rods and the like. If the plant were started up without thoroughly cleaning out these systems, all this debris would find its way into the steam turbine, quickly destroying the machine.

In order to prevent this, before the steam system is connected to the turbine, the steam line is temporarily routed to the atmosphere. High pressure steam is then raised in a heat recovery steam generator (HRSG) or a boiler and allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a steam blow, is quite effective at cleaning out the steam

system. A series of short steam blows, lasting two or three minutes each, is performed several times daily over a period of two or three weeks. At the end of this procedure, the steam line is connected to the steam turbine, which is then ready for operation.

These steam blows can produce noise as loud as 130 dBA at a distance of 100 feet. This would attenuate to about 82 dBA at a distance of five miles from the GSEP site, and 77 dBA at the prisons nine miles from the GSEP site. While this is an annoying noise level, even at these great distances from the GSEP site, there are no noise sensitive receptors within these distances and the noise would attenuate further with greater distances.

## Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards and has recognized those applicable LORS that would protect construction workers (GSEP 2009a).

The applicant did not perform full noise modeling for GSEP operation because there were no noise sensitive receptors in the vicinity of the GSEP that would be impacted by operating noise (GSEP 2009a).

The applicant estimates that GSEP operational noise levels would be less than 30 dBA at a distance of five miles. GSEP operating noise would thus comply with the standard set by the Riverside County General Plan (60 dBA CNEL at the nearest receptor).

## Closure and Decommissioning Impacts

In the future, upon closure of GSEP, all operational noise from the project would cease, and no further adverse noise impacts from operation of GSEP would be possible. The remaining potential temporary noise source is the dismantling of the structures and equipment and any site restoration work that may be performed. Since the noise would be similar to that caused by the original construction, it would likely cause no noise impacts given the remote location of the project. Any noise LORS that are in existence at that time would apply.

## Alternatives

### *Reduced Acreage Alternative*

The Reduced Acreage alternative would most likely correspond to lower operational noise, given that only half of the noise generating equipment (steam turbine generator, wet cooling tower, etc) would be included in the GSEP. Because there are no noise sensitive receptors within the vicinity of the GSEP, noise impacts for the Reduced Acreage alternative would most likely be the same, as for the proposed GSEP.

Because this alternative would result in fewer construction activities conducted at greater distances from sensitive receptors than the proposed GSEP, the analysis for the proposed GSEP demonstrates that the Reduced Acreage alternative can be built and operated in compliance with all applicable noise and vibration laws, ordinances, regulations, and standards. Also, if built in

accordance with the conditions of certification proposed for the proposed GSEP, it would produce no significant adverse noise impacts on people within the affected area.

### *Dry Cooling Alternative*

For the Dry Cooling Alternative, it is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power block. Approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans, or ACCs, would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 202 AFY. This reduction in water use would reduce impacts to water and biological resources.

The use of a Dry Cooling Alternative would introduce additional noise sources to the overall plant design, consisting of fans, motors, and gearboxes, but would eliminate cooling tower noise (a noise source that significantly contributes to GSEP noise levels). The overall difference in GSEP noise level between dry cooling and wet cooling would be small.

The far field noise level for the Dry Cooling Alternative is expected to be approximately 60 dBA at 400 feet (GSEP 2009f). This level would attenuate to approximately 47 dBA at the facility fenceline (approximately 1,800 feet from the proposed position of the ACC) and approximately 25 dBA at a distance of five miles from the GSEP site, compared to less than 30 dBA at five miles for the proposed GSEP. As with the proposed cooling system, no change in ambient noise levels at any noise sensitive receptor would result from the GSEP because there are no such receptors within the vicinity of the GSEP.

### *No Action Alternative A*

Under this alternative, the proposed GSEP would not be approved by BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the GSEP site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the construction and operation noise-related impacts of the GSEP would not occur at the proposed site.

However, the land on which the GSEP is proposed would remain available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of the GSEP, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

### *No Project Alternative B*

Under this alternative, the proposed GSEP would not be approved by BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the GSEP site. As a result, it is possible that another solar energy project could be constructed on the GSEP site.

Different solar technologies use different machinery during construction and would create different ambient noise levels during operation; however, it is expected all technologies would require the use of large construction vehicles that would create unwanted noise and some intermittent noise during operations. However, as with the proposed GSEP, it is expected that solar technologies create minor increases in ambient noise during operation. As such, this No Project Alternative could result in an impact from increased ambient noise during construction and operation similar to under the proposed GSEP.

### *No Project Alternative C*

Under this alternative, the proposed GSEP would not be approved by BLM and the BLM would amend the CDCA Plan to make the proposed GSEP site unavailable for future solar development. As a result, no solar energy project would be constructed on the GSEP site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain with the existing ambient noise from its existing condition. Ambient noise of the site is not expected to change noticeably from existing conditions and, as such, this Alternative would not result in impacts from any increase in noise at the GSEP site. However, in the absence of the GSEP, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

## 4.9.3 Discussion of Cumulative Impacts

The geographic scope for considering cumulative noise impacts on sensitive receptors for this GSEP consists of the region immediately surrounding any identified receptors. There are no noise-sensitive receptors within nine miles of the GSEP site, the fact of which inherently precludes the possibility for cumulative noise impacts from the GSEP.

## 4.9.4 Summary of Mitigation Measures

The mitigation measures imposed by the Energy Commission as Conditions of Certification for the GSEP would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G. The following mitigation measures would avoid or minimize impacts on noise resources:

NOISE-1, NOISE-2, NOISE-3, NOISE-4

## 4.9.5 Residual Impacts after Mitigation Measures were Implemented

None.

## 4.9.6 Unavoidable Adverse Impacts

None.

# 4.10 Impacts on Paleontological Resources

## 4.10.1 Impact Assessment Methodology

Information from the Natural History Museum of Los Angeles County (NHMLA) (McLeod, 2009), the University of California Museum of Paleontology at Berkeley (UCMP 2009), and the Riverside County Land Information System (RCLIS 2009) was reviewed for information regarding known fossil localities and stratigraphic unit sensitivity within the proposed GSEP area. Site-specific information generated by the applicant for the proposed GSEP was also reviewed. All research was conducted in accordance with accepted assessment protocol (SVP 1995) to determine whether any known paleontological resources exist in the general area and how they might be impacted by the proposed action and alternatives.

## 4.10.2 Discussion of Direct and Indirect Impacts

### Proposed Action

Construction of the proposed GSEP will include grading, foundation excavation, and utility trenching. These activities could damage or destroy paleontological resources. Based on the soils profile, SVP assessment criteria, and recorded fossil localities within 25 miles of the proposed site, the probability of encountering paleontological resources is considered to be negligible in the upper 1.5 feet of most of the GSEP site. Sediments at the surface along the northern and southern borders of the site, as well as all sediments below 1.5 feet of the remainder of the site, should initially be treated as highly sensitive (PYFC Condition 2, Class 4a, 4b). After monitoring of grading and trenching activities during proposed construction of the site, a qualified professional paleontologist may determine the appropriate depth above which the coarse grained soils are Holocene in age, have a low sensitivity, and low potential for adverse impacts on paleontological resources.

As the value of paleontological resources is predicated on their discovery within a specific geological host unit, construction of the GSEP could result in a net gain to the science of paleontology by allowing fossils that would not otherwise have been found to be recovered, identified, studied, and preserved.

Operation of the GSEP would not present additional risk to paleontological resources. Once ground disturbing activity is complete, plant operation has no real potential to further affect paleontological resources.

Decommissioning of the GSEP is expected to result in no adverse impacts related to paleontology. Any potential impact to paleontological resources would have occurred and been completed during the ground disturbing phase of project construction.

# Alternatives

## *Reduced Acreage Alternative*

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed GSEP, including a 125-MW solar facility located within the boundaries of the proposed GSEP as defined by the applicant. This alternative eliminates about 50 percent of the proposed site footprint so impacts are reduced.

This alternative is located entirely within the boundaries of the proposed GSEP, so all of the aspects of the setting and existing conditions for the GSEP are also pertinent to this alternative except the project description. The project description for this alternative eliminates the eastern solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed GSEP, as well as the area affected by the linear GSEP components.

This Alternative would create no additional impacts and would lower the potential to encounter fossils by virtue of a reduced construction footprint.

## *Dry Cooling Alternative*

This alternative is located entirely within the boundaries of the proposed GSEP. It eliminates the use of wet-cooling towers and incorporates the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed GSEP.

Because the ACC system would be located at the same location as the proposed cooling towers within the proposed GSEP site and would not require any additional grading, impacts to paleontological resources from use of the ACC system are expected to be the same as with the proposed wet-cooling system. No additional ground disturbance would be required. Therefore, no additional disturbance to paleontological resources would be expected.

## *No Action Alternative A*

Under this alternative, the proposed GSEP would not be approved by the BLM, and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the GSEP site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would not be amended and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no new ground disturbance. As a result, no loss or degradations to paleontological resources from construction or operation of the proposed GSEP would occur. However, the land on which the GSEP is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land-use plan amendment. In addition, in the absence of the GSEP, other renewable energy projects may be constructed elsewhere to meet state and federal mandates, and those projects would have similar impacts in other locations.

As the value of paleontological resources is predicated on their discovery within a specific geological host unit, construction of the GSEP could result in a net gain to the science of paleontology by allowing fossils that would not otherwise have been found to be recovered, identified, studied, and preserved. No Action Alternative A would preclude this potential net gain.

### *No Project Alternative B*

Under this alternative, the proposed GSEP would not be approved by the BLM, and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the GSEP site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, ground disturbance would result from the construction and operation of the solar technology and would likely result in a loss or degradation to paleontological resources. Different solar technologies require different amounts of grading and maintenance; however, it is expected that all solar technologies require some grading and ground disturbance. As such, No Project Alternative B could result in impacts to paleontological resources similar to the impacts of the proposed GSEP.

### *No Project Alternative C*

Under this alternative, the proposed GSEP would not be approved by the BLM, and BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the GSEP site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no corresponding land disturbance. As a result, paleontological resources on the site would not be expected to change noticeably from existing conditions. Therefore, this No Project Alternative would not result in impacts to paleontological resources. However, in the absence of the GSEP, other renewable energy projects may be constructed elsewhere to meet state and federal mandates, and those projects would have similar impacts in other locations.

As the value of paleontological resources is predicated on their discovery within a specific geological host unit, construction of the GSEP could result in a net gain to the science of paleontology by allowing fossils that would not otherwise have been found to be recovered, identified, studied, and preserved. No Project Alternative C would preclude this potential net gain.

## 4.10.3 Discussion of Cumulative Impacts

Renewable energy projects on BLM and non-BLM administered lands, as shown in Table 4.1-1. Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.

These projects are defined within a geographic area that has been identified by the BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. The geographic area considered for cumulative impacts on paleontology is the Chuckwalla Valley in the southeastern area of the Mojave Desert geomorphic province.

Reasonably foreseeable future projects in the immediate GSEP area, are shown in Table 4.1-1. These projects would be subject to CEQA and/or NEPA environmental review which would include requirements for construction monitoring and mitigation of potential paleontological resources. When properly implemented and enforced, these safeguards should reduce potential impacts and provide adequate protection for paleontological resources.

Construction of the GSEP would require localized excavation over a very large area. Because the project area lies within geological units with moderate to high paleontological sensitivity, the required excavation could, potentially, damage paleontological resources. Any damage could be cumulative to damage from other projects within the same geological formations. Implementation and enforcement of a properly designed Paleontological Resource Monitoring and Mitigation Plan (PRMMP) at this GSEP site should result in a net gain to the science of paleontology by allowing fossils that would not otherwise have been found to be recovered, identified, studied, and preserved. Cumulative impacts from GSEP, in consideration with other nearby similar projects, should therefore be either neutral (no fossils encountered) or positive (fossils encountered, preserved, and identified).

Cumulative impacts would vary by alternative only to the degree to which direct and indirect impacts would vary by alternative.

## 4.10.4 Summary of Mitigation Measures

The mitigation measures imposed by the Energy Commission as Conditions of certification for the GSEP would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in **Appendix G**. To mitigate impacts to paleontological resources, the following measures will be implemented:

PAL-1, PAL-2, PAL-3, PAL-4, PAL-5, PAL-6, PAL-7

## 4.10.5 Residual Impacts after Mitigation Measures were Implemented

No residual impacts on paleontological resources would exist after mitigation measures were implemented. Implementation of mitigation should result in a net gain to the science of paleontology by allowing fossils that would not otherwise have been found to be recovered, identified, studied, and preserved.

## 4.10.6 Unavoidable Adverse Impacts

If mitigation is implemented, no unavoidable adverse impacts would be expected to occur. Construction associated with the GSEP could add to fossil discoveries which would enhance understanding of the prehistoric climate, geology, and geographic setting of the region for the benefit of current and future generations.

# 4.11 Impacts on Public Health and Safety

## 4.11.1 Impact Assessment Methodology

To complete this analysis of environmental consequences associated with impacts on public health and safety, the BLM considered potential impacts on the following issue areas: hazardous materials/hazardous waste, waste management, unexploded ordnance (UXO), abandoned mined lands (AML), undocumented immigrants (UDI), transmission line safety and nuisance, traffic and transportation safety, worker safety and fire protection, public and private air strips/airfields, and geologic hazards. The approach for each of these issues is described below.

## 4.11.2 Hazardous Materials

### 4.11.2.1 Impact Assessment Methodology

#### *Risk of Accidents and Spills*

This analysis includes a review and assessment of the potential for the transportation, handling, and use of hazardous materials to impact the surrounding community. All chemicals were evaluated. This analysis addresses the potential impacts on all members of the population including the young, the elderly, and people with existing medical conditions that may make them more sensitive to the adverse effects of hazardous materials. In order to accomplish this goal, staff utilized the most current public health exposure levels (both acute and chronic) that are established to protect the public from the effects of an accidental chemical release.

In order to assess the potential for released hazardous materials to travel off site and affect the public, this analysis includes several aspects of the proposed use of these materials at the facility. It is recognized that some hazardous materials must be used at power plants. Therefore, this analysis was conducted by examining the choice and amount of chemicals to be used, the manner in which the Applicant would use the chemicals, the manner by which they would be transported to the facility and transferred to facility storage tanks, and the way in which the Applicant plans to store the materials on site.

Engineering and administrative controls concerning hazardous materials use are included as part of the Proposed Action. Engineering controls are the physical or mechanical systems, such as storage tanks or automatic shut-off valves, that can prevent the spill of hazardous material from occurring, or that can either limit the spill to a small amount or confine it to a small area. Administrative controls are the rules and procedures that workers at the facility must follow that would help to prevent accidents or to keep them small if they do occur. Both engineering and administrative controls can act as methods of prevention or as methods of response and minimization. In both cases, the goal is to prevent a spill from moving off site and causing harm to the public.

This analysis includes a review and evaluation of the Applicant's proposed use of hazardous materials as described by the Applicant (GSEP 2009a, Section 5.12). To conduct this analysis, the BLM followed these five steps:

**Step 1:** Review of the chemicals and the amounts proposed for on-site use as listed in Table 5.12-1 of the AFC (GSEP 2009a) and determined the need and appropriateness for their use.

**Step 2:** Removed from further assessment those chemicals proposed for use in small amounts or whose physical state is such that there is virtually no chance that a spill would migrate off site and impact the public.

**Step 3:** Review and evaluate measures proposed by the Applicant to prevent spills, including engineering controls, such as automatic shut-off valves and different-sized transfer-hose couplings, and administrative controls such as worker training and safety management programs.

**Step 4:** Review and evaluate measures proposed by the Applicant to respond to accidents. These measures also included engineering controls such as catchment basins and methods to keep vapors from spreading and administrative controls such as training emergency response crews.

**Step 5:** Analyze the theoretical impacts on the public of a worst-case spill of hazardous materials, as reduced by the mitigation measures proposed by the Applicant. When mitigation methods proposed by the Applicant would be sufficient, no further mitigation is recommended. If additional mitigation measures would improve the Proposed Action, additional prevention and response controls are proposed.

### *Health Risk Assessment*

A screening level risk assessment has been performed using simplified assumptions that are intentionally biased toward protection of public health. That is, an analysis was designed that overestimated public health impacts from exposure to the emissions of the Proposed Action. In reality, it is likely that the actual risks from the Proposed Action would be much lower than the risks as estimated by the screening level assessment. The risks for screening purposes are based on examining conditions that would lead to the highest, or worst-case, risks and then using those conditions in the study. Such conditions include:

1. using the highest levels of pollutants that could be emitted from the plant;

2. assuming weather conditions that would lead to the maximum ambient concentration of pollutants;

3. using the type of air quality computer model that predicts the greatest plausible impacts;

4. calculating health risks at the location where the pollutant concentrations are estimated to be the highest;

5. assuming that an individual's exposure to cancer-causing agents occurs continuously for 70 years; and

6. using health-based standards designed to protect the most sensitive members of the population (i.e., the young, elderly, and those with respiratory illnesses).

A screening level risk assessment, at a minimum, would include the potential health effects from inhaling hazardous substances. Some facilities may also emit certain substances that could present a health hazard from non-inhalation pathways of exposure (OEHHA 2003, Tables 5.1, 6.3, 7.1). When these substances are present in facility emissions, the screening level analysis includes the following additional exposure pathways: soil ingestion, dermal exposure, and mother's milk (OEHHA 2003, p. 5-3).

The risk assessment process for the proposed GSEP addresses two categories of health impacts: chronic (long-term) non-cancer effects, and cancer risk (also long-term). Since the only toxic air contaminant (TAC) emitted from this Proposed Action would be diesel particulate from diesel-fueled, emergency engines, and since only long-term health effects have been established for diesel particulate, no acute (short-term) health effects are calculated for this Proposed Action.

Chronic health effects are those that arise as a result of long-term exposure to lower concentrations of pollutants. The exposure period is considered to be approximately from 12 percent to 100 percent of a lifetime, or from eight to 70 years (OEHHA 2003, p. 6-5). Chronic health effects include diseases such as reduced lung function and heart disease.

The analysis for non-cancer health effects compares the maximum GSEP contaminant levels to safe levels called *Reference Exposure Levels*, or RELs. These are amounts of toxic substances to which even sensitive people can be exposed and suffer no adverse health effects (OEHHA 2003, p. 6-2). These exposure levels are designed to protect the most sensitive individuals in the population, such as infants, the aged, and people suffering from illness or disease which makes them more sensitive to the effects of toxic substance exposure. The RELs are based on the most sensitive adverse health effect reported in the medical and toxicological literature and include margins of safety. The margin of safety addresses uncertainties associated with inconclusive scientific and technical information available at the time of standard setting and is meant to provide a reasonable degree of protection against hazards that research has not yet identified. The margin of safety is designed to prevent pollution levels that have been demonstrated to be harmful, as well as to prevent lower pollutant levels that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree. Health protection is achieved if the estimated worst-case exposure is below the relevant REL. In such a case, an adequate margin of safety exists between the predicted exposure and the estimated threshold dose for toxicity.

Exposure to multiple toxic substances may result in health effects that are equal to, less than, or greater than effects resulting from exposure to the individual chemicals. Only a small fraction of the thousands of potential combinations of chemicals have been tested for the health effects of combined exposures. In conformity with the California Air Pollution Control Officers Association (CAPCOA) guidelines, the health risk assessment assumes that the effects of each substance are additive for a given organ system (OEHHA 2003, pp. 1-5, 8-12). Other possible mechanisms due to multiple exposures include those cases where the actions may be synergistic or antagonistic (where the effects are greater or less than the sum, respectively). For these types of substances, the health risk assessment could underestimate or overestimate the risks.

For carcinogenic substances, the health assessment considers the risk of developing cancer and assumes that continuous exposure to the cancer-causing substance occurs over a 70-year lifetime. The risk that is calculated is not meant to project the actual expected incidence of cancer, but rather a theoretical upper-bound number based on worst-case assumptions.

Cancer risk is expressed in chances per million and is a function of the maximum expected pollutant concentration, the probability that a particular pollutant will cause cancer (called *potency factors* and established by OEHHA), and the length of the exposure period. Cancer risks for each carcinogen are added to yield total cancer risk. The conservative nature of the screening assumptions used means that actual cancer risks due to emissions from the Proposed Action are likely to be considerably lower than those estimated.

The screening analysis is performed to assess worst-case risks to public health associated with the Proposed Action. If the screening analysis predicts no significant risks, then no further analysis is required. However, if risks are above the significance level, then further analysis, using more realistic site-specific assumptions, would be performed to obtain a more accurate assessment of potential public health risks.

### Chronic Non-cancer Health Effects

The assessment of non-cancer health effects is calculated using a *hazard index*. A hazard index is a ratio comparing exposure from facility emissions to the reference (safe) exposure level. A ratio of less than 1.0 signifies that the worst-case exposure is below the safe level. The hazard index for every toxic substance that has the same type of health effect is added to yield a Total Hazard Index. A Total Hazard Index of less than 1.0 indicates that cumulative worst-case exposures are less than the RELs. Under these conditions, health protection from the Proposed Action is likely to be achieved, even for sensitive members of the population. In such a case, it is presumed that there would be no significant non-cancer project-related public health impacts.

### Cancer Risk

Regulations implementing the provisions of Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986 (Health & Safety Code Section 25249.5 et seq.) were used for guidance to determine a cancer risk significance level. Title 22, California Code of Regulations Section 12703(b) states that "the risk level which represents no significant risk shall be one which is calculated to result in one excess case of cancer in an exposed population of 100,000, assuming lifetime exposure." This level of risk is equivalent to a cancer risk of 10 in one million, which is also written as $10 \times 10^{-6}$. An important distinction is that the Proposition 65 significance level applies separately to each cancer-causing substance, whereas this analysis bases significance on the total risk from all cancer-causing chemicals. Thus, the manner in which the significance level is applied in this analysis is more conservative (health-protective) than that applied by Proposition 65.

As noted earlier, the initial risk analysis for a Proposed Action is typically performed at a screening level, which is designed to overstate actual risks, so that health protection can be ensured. The analysis also addresses potential impacts on all members of the population including

the young, the elderly, people with existing medical conditions that may make them more sensitive to the adverse effects of toxic air contaminants and any minority or low-income populations that are likely to be disproportionately affected by impacts. To accomplish this goal, this analysis uses the most current acceptable public health exposure levels set to protect the public from the effects of airborne toxics. When a screening analysis shows cancer risks to be above the significance level, refined assumptions would likely result in a lower, more realistic risk estimate. Based on refined assumptions, if risk posed by the facility exceeds the significance level of 10 in one million, appropriate measures would be required to reduce the risk to less than significant. If, after all risk reduction measures had been considered, a refined analysis identifies a cancer risk greater than 10 in one million, the risk would be deemed to be significant.

## 4.11.2.2 Discussion of Direct and Indirect Impacts

### *Accidents and Spills*

The types of hazardous materials that would be used during construction and operation of GSEP are identified in Table 4.11-1, including the material name, Chemical Abstracts Service (CAS) Number, the application/use of the chemical, the hazard characteristics, the maximum quantity proposed for use on site, and the CERCLA/SARA reportable quantity (RQ). The purpose of this hazardous materials management analysis is to identify the hazardous materials that would be used at the GSEP site and to determine the affects of their transportation to the site, the use, handling, storage, and disposal on the environment.

The affects are determined by the following:

1. identifying the types and amounts of hazardous substances that GSEP could emit to the environment;

2. estimating amounts of pollutants that people could be exposed to through inhalation, ingestion, and dermal contact; and

3. characterizing potential health risks by comparing worst-case exposure to safe standards based on known health effects.

### *Small Quantity Hazardous Materials*

During the construction phase of the Proposed Action, hazardous materials proposed for use include paint, solvents, gasoline, diesel fuel, motor oil, lubricants, and welding gases (GSEP 2009a, Section 5.12.2.2). No acutely toxic hazardous materials would be used on site during construction, and none of these materials pose significant potential for off-site impacts as a result of the quantities on site, their relative toxicity, their physical state, and/or their environmental mobility. Any impact of spills or other releases of these materials would be limited to the site because of the small quantities involved, their infrequent use (and therefore reduced chances of release), and/or the temporary containment berms used by contractors. Petroleum hydrocarbon-based motor fuels, mineral oil, lube oil, and diesel fuel are all very low volatility and represent limited off-site hazards even in larger quantities.

**TABLE 4.11-1**
**HAZARDOUS MATERIALS PROPOSED FOR USE AT THE GSEP**

| Material | CAS No. | Application | Hazardous Characteristics | Maximum Quantity On Site | CERCLA SARA RQ[a] |
|---|---|---|---|---|---|
| Acetylene | 74-86-2 | Welding gas | Health: moderate toxicity<br>Physical: toxic | 600 cubic feet | |
| Argon | 7440-37-1 | Welding gas | Health: low toxicity<br>Physical: non-flammable gas | 600 cubic feet | |
| Carbon Dioxide | | | Health: low toxicity<br>Physical: non-flammable gas | 15 tons | |
| Diesel Fuel | | Equipment refueling and emergency diesel fire pump | Health: low toxicity<br>Physical: combustible liquid | 3,600 gallons | |
| Fertilizer<br>Monopotassium Phosphate | | Treatment of HTF contaminated soil | Health: low toxicity<br>Physical: irritant | 250 pounds | |
| Fertilizer<br>Urea | | Treatment of HTF contaminated soil | Health: low toxicity<br>Physical: N/A | 250 pounds | |
| Hydraulic Fluid | | High-pressure combustion turbine starting system, turbine control valve actuators | Health: low to moderate toxicity<br>Physical: Class IIIB combustible liquid | 500 gallons in equipment, maintenance inventory of 110 gallons in 55-gallon steel drums | |
| Hydrogen | | Steam turbine generator cooling | Health: low toxicity<br>Physical: flammable gas | 20,000 SCF | |
| Lube Oil | | Lubricate rotating equipment (e.g., gas turbine and steam-turbine bearings) | Health: low toxicity<br>Physical: N/A | 10,000 gallons in equipment and piping, additional maintenance inventory of up to 550 gallons in 55-gallon steel drums | |
| Mineral Insulating Oil | | Transformers/switchyard | Health: low toxicity<br>Physical: N/A | 32,000 | |
| Natural Gas (Methane) | 74-82-8 | Auxiliary boiler operation | Health: low toxicity<br>Physical: flammable gas | No on-site storage, up to 140 pounds of natural gas in equipment and piping | |
| Nitrogen | 7727-37-9 | | Health: low toxicity<br>Physical: flammable gas | 7,500 pounds | |
| Oxygen | 7782-44-7 | Welding gas | Health: low toxicity<br>Physical: oxidizer | 600 cubic feet | |
| Sodium Hypochlorite (12.5%) | | Cooling tower biological control | Health: high toxicity<br>Physical: Poison-B, corrosive | 8,500 gallons | 100 pounds |
| Sulfur Hexaflouride | | 230-kV breaker insulating medium | Health: none<br>Physical: none | | |
| Sulfuric Acid (29.5%) solution | | | Health: high toxicity<br>Physical: corrosive and water reactive | 2,000 gallons | 1,000 pounds |

**TABLE 4.11-1 (Continued)**
**HAZARDOUS MATERIALS PROPOSED FOR USE AT THE GSEP**

| Material | CAS No. | Application | Hazardous Characteristics | Maximum Quantity On Site | CERCLA SARA RQ[a] |
|---|---|---|---|---|---|
| Sulfuric Acid (93%) solution | | | Health: high toxicity<br>Physical: corrosive and water reactive | 8,500 gallons | 1,000 pounds |
| Therminol VP-1<br>Diphenyl Ether (73.5%)<br>Biphenyl (26.5%) | | Heat transfer fluid in the solar array | Health: moderate toxicity<br>Physical: irritant; combustible liquid (Class III-B) | 2.0 MM gallons | 100 pounds |
| Water Treatment Chemical<br>NALCO Tri-Act 1800<br>Cyclohexlyamine (5 – 10%)<br>Monoehtanolamine (10 – 30%)<br>Methoxyproplyamine (10 – 30%) | | | Health: high toxicity<br>Physical: corrosive, class II combustible liquid | 800 gallons | |
| Water Treatment Chemical<br>NALCO Elimin-Ox<br>Carbohydazide (5 – 10%) | | | Health: moderate toxicity<br>Physical: corrosive | 800 gallons | |
| Water Treatment Chemical<br>NALCO 3D Trasar 3DT185<br>Phosphoric Acid (60 – 100%) | | | Health: high toxicity<br>Physical: corrosive | 800 gallons | |
| Water Treatment Chemical<br>NALCO 3D Trasar 3DT177<br>Phosphoric Acid S30%) | | | Health: moderate toxicity<br>Physical: irritant | 800 gallons | |
| Water Treatment Chemical<br>NALCO 3D Trasar 3DT190 | | | Health: low toxicity<br>Physical: irritant | 800 gallons | |
| Water Treatment Chemical<br>NALCO Acti-Brom ® 7342<br>Sodium Bromide | | | Health: low toxicity<br>Physical: irritant | 800 gallons | |
| Water Treatment Chemical<br>NALCO pHreedom ® 5200M<br>Sodium salt of phosphonomethylated diamine | | | Health: low to moderate toxicity<br>Physical: irritant | 800 gallons | |
| Water Treatment Chemical<br>NALCO PCL-1346 | | | Health: low toxicity<br>Physical: irritant | 800 gallons | |
| Water Treatment Chemical<br>NALCO Permacare ® PC-7408<br>Sodium Bisulfite | | | Health: low toxicity<br>Physical: irritant | 800 gallons | |

**TABLE 4.11-1 (Continued)**
**HAZARDOUS MATERIALS PROPOSED FOR USE AT THE GSEP**

| Material | CAS No. | Application | Hazardous Characteristics | Maximum Quantity On Site | CERCLA SARA RQ[a] |
|---|---|---|---|---|---|
| Water Treatment Chemical NALCO BT-3000<br>Sodium Hydroxide<br>Sodium Tripolyphosphate | | | Health: high toxicity<br>Physical: corrosive | 800 gallons | |
| Water Treatment Chemical NALCO 8338<br>Sodium Nitrate<br>Sodium Tolytriazole<br>Sodium Hydroxide | | | Health: moderate toxicity<br>Physical: toxic | 800 gallons | |

[a] Reportable quantities for a pure chemical, per the Comprehensive Environmental Response, Compensation, and Liability Act.

SOURCE: CEC Genesis RSA, June 2010, Appendix A.

During operations, hazardous chemicals such as cleaning agents, water treatment chemicals, welding gasses, oils, activated carbon, and other various chemicals (see Table 4.11-1 for a list of chemicals proposed to be used and stored at GSEP during operations) would be used and stored in relatively small amounts and represent limited off-site hazards because of their small quantities, low volatility, and/or low toxicity. The Proposed Action would be limited to using, storing, and transporting only those hazardous materials listed in Table 4.11-1.

## *Large Quantity Hazardous Materials*

### Natural Gas

Natural gas poses a fire and/or possible explosion risk because of its flammability. Natural gas is composed of mostly methane, but also contains ethane, propane, nitrogen, butane, isobutene, and isopentane. It is colorless, odorless, tasteless and lighter than air. Natural gas can cause asphyxiation when methane is 90% in concentration. Methane is flammable when mixed in air at concentrations of 5-14%, which is also the detonation range. Natural gas, therefore, poses a risk of fire and/or possible explosion if a release occurs under certain specific conditions. However, it should be noted that, due to its tendency to disperse rapidly (CEC, 2010), natural gas is less likely to cause explosions than many other fuel gases such as propane or liquefied petroleum gas, but can explode under certain confined conditions.

Natural gas at the GSEP site would be used to fuel the auxiliary boilers. It would not be stored on-site but delivered by Southern California Edison via a new 6-mile pipeline that would connect to an existing main north of I-10 (GSEP 2009a, Section 3.4.6). The risk of a fire and/or explosion on site can be reduced to acceptable levels through adherence to applicable codes and the development and implementation of effective safety management practices. The National Fire Protection Association (NFPA) code 85A requires both the use of double-block and bleed valves for gas shut off and automated combustion controls. These measures would significantly reduce the likelihood of an explosion in gas-fired equipment. The safety management plan proposed by the Applicant would address the handling and use of natural gas, and would significantly reduce the potential for equipment failure because of either improper maintenance or human error.

The natural gas pipeline must be designed to meet the appropriate level of California Public Utilities Commission (CPUC) General Order 112 standards and 49 CFR 192 standards. CPUC General Order 112-E, Section 125.1 requires that at least 30 days prior to the construction of a new pipeline, the owner must file a report with the commission that would include a route map for the pipeline. The natural gas pipeline must be constructed and operated in accordance with the Federal Department of Transportation (DOT) regulations, Title 49, Code of Federal Regulations (CFR), Parts 190, 191, and 192 (see Table 1-1 LORS). Compliance with existing LORS would be sufficient to ensure minimal risks of pipeline failure.

### Therminol VP-1

Therminol VP-1 is the heat transfer fluid (HTF) that would be used in the solar panels to collect solar heat and transfer it in order to generate steam to run the steam turbines. Therminol is a mixture of 73.5% diphenyl ether and 26.5% biphenyl, and is a solid at temperatures below

~54 °F. Therminol can therefore be expected to remain liquid if a spill occurs. While the risk of off-site migration is minimal, Therminol is highly flammable and fires have occurred at other solar generating stations that use it. Approximately 2,000,000 gallons of HTF would be stored at the GSEP contained in the pipes and heat exchanger. Isolation valves would be placed throughout the HTF piping system designed to automatically block off sections of the piping in which a loss of pressure is detected (GSEP 2009a, Section 5.12.2.3).

### *Construction-related Risks to Public Health*

Potential risks to public health during construction may be associated with exposure to toxic substances in contaminated soil disturbed during site preparation as well as diesel exhaust from heavy equipment operation. Criteria pollutant impacts from the operation of heavy equipment and particulate matter from earth moving are examined in Chapter 3.2 and 4.2.

The operation of construction equipment will result in air emissions from diesel-fueled engines. Diesel emissions are generated from sources such as trucks, graders, cranes, welding machines, electric generators, air compressors, and water pumps. Although diesel exhaust contains criteria pollutants such as nitrogen oxides, carbon monoxide, and sulfur oxides, it also includes a complex mixture of thousands of gases and fine particles. These particles are primarily composed of aggregates of spherical carbon particles coated with organic and inorganic substances. Diesel exhaust contains over 40 substances that are listed by the U.S. Environmental Protection Agency (U.S. EPA) as hazardous air pollutants and by the California Air Resources Board (ARB) as toxic air contaminants.

Exposure to diesel exhaust may cause both short- and long-term adverse health effects. Short-term effects can include increased cough, labored breathing, chest tightness, wheezing, and eye and nasal irritation. Long-term effects can include increased coughing, chronic bronchitis, reductions in lung function, and inflammation of the lung. Epidemiological studies also strongly suggest a causal relationship between occupational diesel exhaust exposure and lung cancer.

Based on a number of health effects studies, the Scientific Review Panel (SRP)[1] on Toxic Air Contaminants recommended a chronic REL for diesel exhaust particulate matter of 5 $\mu g/m^3$ and a cancer unit risk factor of $3x10^{-4}$ $(\mu g/m^3)^{-1}$ (SRP 1998, p. 6). [The SRP, established pursuant to California Health and Safety Code section 39670, evaluates the risk assessments of substances proposed for identification as Toxic Air Contaminants by ARB and the Department of Pesticide Regulation (DPR). The SRP reviews the exposure and health assessment reports and the underlying scientific data upon which the reports are based.] The SRP did not recommend a value for an acute REL, since available data in support of a value was deemed insufficient. On August 27, 1998, ARB listed particulate emissions from diesel-fueled engines as a toxic air contaminant and approved SRP's recommendations regarding health effect levels.

[1] The SRP, established pursuant to California Health and Safety Code Section 39670, evaluates the risk assessments of substances proposed for identification as Toxic Air Contaminants by ARB and the Department of Pesticide Regulation (DPR). The SRP reviews the exposure and health assessment reports and the underlying scientific data upon which the reports are based.

Construction of the GSEP, including site preparation, is anticipated to take place over a period of 37 months (GSEP 2009a, Section 3.7.1). As noted earlier, assessment of chronic (long-term) health effects assumes continuous exposure to toxic substances over a significantly longer time period, typically from eight to seventy years.

In order to model the cancer risk from construction emissions the Applicant conducted a health risk assessment for diesel particulate matter (DPM) from construction equipment emissions in accordance with methods provided by the South Coast AQMD in their guidance documents on modeling cancer risk from mobile sources. The Applicant's modeling of worst-case construction emissions adjusted to a 37-month period (lifetime exposure adjustment factor of 0.0126) found that the cancer risk was estimates to be 0.1 in one million at the maximum impact receptor (MIR), below the level of significance (10 in one million). The chronic hazard index was found to be 0.005 at the MIR, below the level of significance of 1.0 (GSEP 2009f, CEC Data Response Item 137).

### *Emissions Sources*

The emissions sources at the proposed GSEP site include two natural gas-fired auxiliary boilers, two cooling tower, two diesel-fueled emergency generators, two diesel-fueled emergency fire pumps, DPM from maintenance vehicles, and VOCs from HTF fugitive emissions.

As noted earlier, the first step in a health risk assessment is to identify potentially toxic compounds that may be emitted from the facility. Table 5.15-3 of the AFC lists toxic air contaminants that may be emitted by the project. Each TAC has a toxicity value published in the OEHHA Guidelines that includes the REL used to calculate short-term and long-term noncancer health effects, and the cancer unit risks used to calculate the lifetime risk of developing cancer (OEHHA 2003).

Table 4.11-2 lists toxic emissions potentially emitted from the GSEP and shows how each contributes to the health risk analysis. For example, the first row shows that oral exposure to acetaldehyde is not of concern, but if inhaled, may have cancer and chronic (long-term) noncancer health effects, but not acute (short-term) effects.

Appendix B.1 of the AFC (GSEP 2009a) and Data Responses Set 1A Appendix K (GSEP 2009f) list non-criteria pollutants and their emission factors that may be emitted from the sources listed above. Emission factors were obtained from the U.S. EPA emission factors database (AP-42), the California Air Toxics Emission Factors (CATEF II) database, and the vendors for particular equipment. Table B.1-7 of the AFC (GSEP 2009a) and its updated version Table K.1-7 (GSEP 2009f) list emissions from maintenance vehicles including DPM.

In response to CEC Data Requests 141 and 142, the Applicant stated that emissions of HTF toxic thermal degradation products be determined and considered in a HRA. According to the Applicant's response, HTF may decompose into the following gases in the ullage system (GSEP 2009f, CEC Data Response Item 141):

- 89.9 percent by weight Benzene
- 9.8 percent by weight Phenol
- 0.3 percent by weight Other VOCs

**TABLE 4.11-2**
**TYPES OF HEALTH IMPACTS AND EXPOSURE ROUTES ATTRIBUTED TO TOXIC EMISSIONS**

| Substance | Oral Cancer | Oral Noncancer | Inhalation Cancer | Noncancer (Chronic) | Noncancer (Acute) |
|---|---|---|---|---|---|
| Acetaldehyde | | | X | X | |
| Acrolein | | | | X | X |
| Arsenic | X | X | X | X | X |
| Benzene | | | X | X | X |
| Biphenyl | | | | | |
| 1-3 Butadiene | | | X | X | |
| Cadmium | | X | X | X | |
| Copper | | | | X | X |
| Diesel Exhaust | | | X | X | |
| Ethylbenzene | | | | X | |
| Formaldehyde | | | X | X | X |
| Hexane | | | | X | |
| Naphthalene | | X | X | X | |
| Polycyclic Aromatic Hydrocarbons (PAHs) | X | X | X | X | |
| Propylene | | | | X | |
| Propylene oxide | | | X | X | X |
| Selinium | | | | X | X |
| Toluene | | | | X | X |
| Xylene | | | | X | X |

*SOURCE: CEC Genesis RSA, June 2010, Public Health Table 2.

The Applicant noted that the MSDS sheet for the HTF states that decomposition products of HTF (benzene and phenol) occur in trace amounts. In addition, the Applicant proposes to use carbon adsorption technology for the HTF ullage system which is assumed to result in 99% control of VOCs. Therefore, 5 percent by weight of total VOCs were used to represent the upper limit for trace amounts of benzene and phenol. Table 3 of CEC Data Response 141 provides the estimated emissions of benzene and phenol from HTF system components (GSEP 2009f).

### *Emissions Levels*

Once potential emissions are identified, the next step is to quantify them by conducting a "worst case" analysis. Maximum hourly emissions are required to calculate acute (one-hour) noncancer health effects, while estimates of maximum emissions on an annual basis are required to calculate cancer and chronic (long-term) noncancer health effects.

The next step in the health risk assessment process is to estimate the ambient concentrations of toxic substances that may result from the project. This is accomplished by using a screening air dispersion model and assuming conditions that result in maximum impacts. The applicant's screening analysis was performed using the ARB/OEHHA Hotspots Analysis and Reporting Program (HARP) modeling program. Finally, ambient concentrations were used in conjunction

with RELs and cancer unit risk factors to estimate health effects which might occur from exposure to facility emissions. Exposure pathways, or ways in which people might come into contact with toxic substances, include inhalation, dermal (through the skin) absorption, soil ingestion, consumption of locally grown plant foods, and mother's milk.

The above method of assessing health effects is consistent with OEHHA's Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA 2003) referred to earlier, and results in the following health risk estimates.

## *Proposed Action*

The Applicant's revised screening health risk assessment, including all sources as presented in CEC Data Response 139 resulted in a maximum acute hazard index of 0.00668 and a maximum chronic hazard index of 0.00119 at the Maximum Impact Receptor (MIR). The MIR represents the residential receptor where the highest concentrations of project-related pollutants would exist. The cancer risk was calculated to be 3.27 in 1,000,000 at the MIR.

Table 4.11-3 shows, both acute and chronic hazard indices are under the significance level of 1.0 and cancer risk is under the significant level of 10 in 1,000,000, indicating that no cancer or short- or long-term adverse health effects are expected.

**TABLE 4.11-3**
**OPERATION HAZARD/RISK AT THE MAXIMUM IMPACT RECEPTOR**

| Type of Hazard/Risk | Hazard Index/Risk | Significance Level | Significant? |
|---|---|---|---|
| Acute Noncancer | 0.007 | 1.0 | No |
| Chronic Noncancer | 0.001 | 1.0 | No |
| Individual Cancer | 3.3 in one million | 10 in one million | No |

SOURCE: CEC Genesis RSA, June 2010, Public Health Table 3.

### Construction Phase Analysis

For the construction phase analysis, atmospheric dispersion modeling of diesel particulate matter (DPM) emissions from construction equipment and vehicles was conducted by the applicant using AERMOD. The maximum predicted offsite concentration of diesel particulate matter was reported by the applicant to be 0.02562 ug/$m^3$. Cancer risk due to diesel exhaust emissions was determined by multiplying the DPM concentration by the diesel cancer inhalation unit risk of 0.0003 (ug/$m^3$)$^{-1}$ and an adjustment factor of 0.0126 to account for the 37 month construction period. Cancer risk at the location of the maximum offsite concentration was determined to be 0.1 in a million and chronic HI to be 0.005 (noncancer chronic REL is 5 ug/$m^3$).

### Operations Phase Analysis

For the operations phase analysis, atmospheric dispersion modeling of facility emissions was conducted by the applicant using AERMOD. Local meteorological data were used, on-site buildings were included for building downwash effects, and 6814 grid receptors were modeled.

A total of 23 emitting units were modeled by the applicant for facility operations including:

a. 2 auxiliary boilers
b. 2 diesel emergency generators
c. 2 diesel firewater pumps
d. 2 HTF (heat transfer fluid) vents
e. 14 wet cooling tower cells (2 cooling towers, each with 7 cells)
f. Fugitive emissions of toxic thermal degradation products of HTF and fugitive emissions of mobile sources involved in routine operations. These emissions were modeled as being emitted from a single area source located between the two solar fields.
g. Total of 23 emitting sources evaluated at the proposed facility.

The HTF (heat transfer fluid) is circulated through the solar field where it is heated by sunlight concentrated on the receiver tube elements of the solar collectors. HTF is comprised biphenyl/diphenyl oxide. Thermal decomposition of HTF results in decomposition products that can include benzene, phenol and toluene. In modeling HTF fugitive loss emissions, the Applicant assumed that 89.9 percent of the emissions would be comprised of benzene and 9.8 percent of phenol.

The HARP On-Ramp program to load the Applicant's AERMOD results into the CARB/OEHHA Hotspots Analysis and Reporting Program (HARP), Version 1.4a for the risk analysis. Exposure pathways assessed include inhalation, ingestion of home-grown produce, dermal absorption, soil ingestion and mother's milk. Emission factors obtained from the Applicant's modeling files and used in this analysis are listed in Table 4.11-4. For risk calculations using the HARP model, the "Derived (Adjusted) Method" was used for cancer risk and the "Derived (OEHHA) Method" was used for chronic noncancer hazard.

Cancer risk and chronic and acute hazard index values are compared to results reported by the Applicant in the December 2009 response to CEC Data Requests in Table 4.11-5. Risk and hazard were determined at the point of maximum impact, PMI, under the 70 year residential scenario, located between the two solar fields. The nearest residential receptor is located 15 miles from the site and there are no sensitive receptors within six miles of the project site.

Table 4.11-6 presents substance- and source-specific cancer risks at the PMI. Analysis of this table indicates that 100% of the cancer risk at the PMI is attributed to emissions from two sources: 12% due to emissions from the HTF vents and 88% due to fugitive emissions. Additional analysis indicates that 100% of cancer risk at the PMI is attributed to emissions of two substances: 47% due to benzene emissions (from the auxiliary boiler, the HTF vents and fugitive emissions) and 52% due to diesel particulate matter emissions (from onsite mobile sources as well as the two diesel engines).

**TABLE 4.11-4**
**OPERATION PHASE EMISSION RATES**

| Substance | Annual Average Emissions (lbs/year) | Maximum 1-Hour Emissions (lbs/hour) |
|---|---|---|
| Emission Rates from Each of 2 Auxiliary Boilers | | |
| Acetaldehyde | 1.99E-03 | 1.36E-04 |
| Acrolein | 1.95E-03 | 1.33E-04 |
| Benzene | 1.05E-03 | 7.15E-05 |
| Ethylbenzene | 9.73E-04 | 6.62E-05 |
| Formaldehyde | 2.05E-03 | 1.40E-04 |
| Hexane | 2.72E-03 | 1.85E-04 |
| Naphthalene | 1.03E-04 | 6.97E-06 |
| PAHs (4) | 3.50E-05 | 2.38E-06 |
| Propylene | 2.00E-01 | 1.36E-02 |
| Toluene | 1.40E-02 | 9.50E-04 |
| Xylene | 8.09E-03 | 5.50E-04 |
| Emission Rates from Each of 14 Cooling Tower Cells | | |
| Arsenic | 2.98E-03 | 9.32E-07 |
| Barium | 1.07E-02 | 3.34E-06 |
| Manganese | 9.40E-03 | 2.94E-06 |
| Emission Rates from Operation of Each of 2 Emergency Generators | | |
| Diesel PM | 2.76E+00 | 5.00E-02 |
| Emission Rates from Operation of Each of 2 Emergency Fire Pumps | | |
| Diesel PM | 1.98E+00 | 4.00E-02 |
| Emission Rates from Each of 2 HTF Vents | | |
| Benzene | 4.85E+02 | 1.53E-01 |
| Phenol | 5.30E+01 | 1.65E-02 |
| Emission Rates from Fugitive Emissions | | |
| Benzene | 6.90E+02 | 1.67E-01 |
| Phenol | 6.90E+02 | 1.67E-01 |
| Diesel PM | 4.60E+01 | 5.25E-03 |

SOURCE: CEC Genesis RSA (July 2010) Public Health Table 5.

**TABLE 4.11-5**
**CANCER RISK AND HAZARD DUE TO OPERATION PHASE EMISSIONS**

| | Staff's Analysis | | | Applicant's Analysis | | |
|---|---|---|---|---|---|---|
| | Cancer Risk (per million) | Acute HI | Chronic HI | Cancer Risk (per million) | Acute HI | Chronic HI |
| PMI (Rec. #1) | 3.27 | 0.0085[a] | 0.0013 | 3.27 | 0.0067 | 0.0012 |

PMI (point of maximum impact) is located between the two solar fields.
[a] At Rec. #266

SOURCE: CEC Genesis RSA (July 2010) Public Health Table 6

**TABLE 4.11-6**
**CONTRIBUTION TO TOTAL CANCER RISK BY INDIVIDUAL SUBSTANCES FROM ALL SOURCES AT THE POINT OF MAXIMUM IMPACT (PMI)**

| Substance | Auxiliary Boilers (2 units) | Cooling Towers (14 cells) | Diesel Generators (2 units) | Diesel Firewater Pumps (2 units) |
|---|---|---|---|---|
| Acetaldehyde | 1.48E-14 | | | |
| Arsenic | | 1.21E-09 | | |
| Benzene | 7.80E-14 | | | |
| DieselExhPM* | | | 1.99E-09 | 6.56E-09 |
| DieselExhPM* | | | 1.99E-09 | 6.56E-09 |
| Ethyl Benzene | 6.29E-15 | | | |
| Formaldehyde | 3.19E-14 | | | |
| Naphthalene | 9.18E-15 | | | |
| PAHs-w/o | 1.46E-11 | | | |
| TOTAL | 1.48E-11 | 1.21E-09 | 3.97E-09 | 1.31E-08 |

| Substance | HTF Vents (2 units) | Fugitive Emissions (1 area source) | Total Cancer Risk |
|---|---|---|---|
| Acetaldehyde | | | 1.48E-14 |
| Arsenic | | | 1.21E-09 |
| Benzene | 3.88E-07 | 1.16E-06 | 1.55E-06 |
| DieselExhPM | | 8.52E-07 | 8.60E-07 |
| Ethyl Benzene | | | 6.29E-15 |
| Formaldehyde | | | 3.20E-14 |
| Naphthalene | | | 9.18E-15 |
| PAHs-w/o | | | 1.46E-11 |
| | | | |
| TOTAL | 3.88E-07 | 2.87E-06 | 3.27E-06 |

SOURCE: CEC Genesis RSA (July 2010) Public Health Table 7.

## *Cooling Towers*

In addition to being a source of potential toxic air contaminants, the possibility exists for bacterial growth to occur in the two wet cooling towers, including Legionella. Legionella is a bacterium that is ubiquitous in natural aquatic environments and is also widely distributed in man-made water systems. It is the principal cause of legionellosis, otherwise known as Legionnaires' Disease, which is similar to pneumonia. Transmission to people results mainly from inhalation or aspiration of aerosolized contaminated water. Untreated or inadequately treated cooling systems, such as industrial cooling towers and building heating, ventilating, and air conditioning systems, have been correlated with outbreaks of legionellosis.

Legionella can grow symbiotically with other bacteria and can infect protozoan hosts. This provides Legionella with protection from adverse environmental conditions, including making it more resistant to water treatment with chlorine, biocides, and other disinfectants. Thus, if not

properly maintained, cooling water systems and their components can amplify and disseminate aerosols containing Legionella.

The State of California regulates recycled water for use in cooling towers in Title 22, Section 60303, California Code of Regulations. This section requires that, in order to protect workers and the public who may come into contact with cooling tower mists, chlorine or another biocide must be used to treat the cooling system water to minimize the growth of Legionella and other micro-organisms. This regulation does not apply to the GSEP project since it intends to use groundwater supplied from on-site wells; however, the potential remains for Legionella growth in cooling water at the GSEP due to nutrients found in groundwater.

The U.S. EPA published an extensive review of Legionella in a human health criteria document (EPA 1999). The U.S. EPA noted that Legionella may propagate in biofilms (collections of microorganisms surrounded by slime they secrete, attached to either inert or living surfaces) and that aerosol-generating systems such as cooling towers can aid in the transmission of Legionella from water to air. The U.S. EPA has inadequate quantitative data on the infectivity of Legionella in humans to prepare a dose-response evaluation. Therefore, sufficient information is not available to support a quantitative characterization of the threshold infective dose of Legionella. Thus, the presence of even small numbers of Legionella bacteria presents a risk - however small - of disease in humans.

In February of 2000 the Cooling Technology Institute (CTI) issued its own report and guidelines for the best practices for control of Legionella (CTI 2000). The CTI found that 40-60 percent of industrial cooling towers tested was found to contain Legionella. More recently, staff has received a 2005 report of testing in cooling towers in Australia that found the rate of Legionella presence in cooling tower waters to be extremely low, approximately three to six percent. The cooling towers all had implemented aggressive water treatment and biocide application programs.

To minimize the risk from Legionella, the CTI noted that consensus recommendations included minimization of water stagnation, minimization of process leads into the cooling system that provide nutrients for bacteria, maintenance of overall system cleanliness, the application of scale and corrosion inhibitors as appropriate, the use of high-efficiency mist eliminators on cooling towers, and the overall general control of microbiological populations.

Good preventive maintenance is very important in the efficient operation of cooling towers and other evaporative equipment (ASHRAE 1998). Preventive maintenance includes having effective drift eliminators, periodically cleaning the system if appropriate, maintaining mechanical components in working order, and maintaining an effective water treatment program with appropriate biocide concentrations. Staff notes that most water treatment programs are designed to minimize scale, corrosion, and biofouling and not to control Legionella.

The efficacy of any biocide in ensuring that bacterial and in particular Legionella growth, is kept to a minimum is contingent upon a number of factors including but not limited to proper dosage amounts, appropriate application procedures and effective monitoring.

## *Alternatives*

### Reduced Acreage Alternative

If the Reduced Acreage Alternative were selected, a utility-scale solar energy generating facility would be developed on the site that would have approximately 50 percent less generating capacity as the Proposed Action. Types of hazardous materials would be substantially similar to the Proposed Action, although the amounts required would be less, commensurate with the reduction by one Unit. As a result, attendant public health and safety risks would be slightly reduced.

### Dry Cooling Alternative

The majority of the toxic emissions from the Dry Cooling Alternative would not change compared with the Proposed Action and would not cause additional impacts. Dry cooling would eliminate the risk of contracting legionellosis by inhaling aerosolized Legionella-contaminated water from wet cooling towers.

As noted in the Section 4.2, the additional construction activities from erecting a dry cooling structure would increase the dust-related PM10 emissions. PM10 impacts are of concern in this public health analysis because health effects can result from the interaction of the toxic pollutants that might be adsorbed to the PM10. Such adsorption would be associated with specific soil contamination that would be remediated before beginning construction. The toxic health risks from diesel equipment emissions would be minimized through implementation of the mitigation measures described in Section 4.2.4, which would also apply to construction of any cooling structures that might be used for the project.

### No Action Alternative A

If No Action Alternative A were selected, there would be no direct or indirect impacts on public health and safety relating to hazardous materials, because the requested ROW application would be denied, no ROW grant authorized, and no amendment of the CDCA Plan would be approved to associate the site with solar energy development at this time. In this case, no cumulative impacts presently would be caused or contributed to under this alternative.

However, No Action Alternative A leaves open the possibility that a subsequent renewable energy facility application could be submitted that would be similar to, greater or less than, the Proposed Action. Depending on the technology proposed, different hazardous materials impacts could result. For example, if “power tower” or PV were proposed for a solar project instead of solar trough technology, no impacts relating the proposed HTF would result because no HTF would be required. Risks and hazards relating to accidents and spills, human health, small quantity hazardous materials, natural gas, construction risks and emissions could be similar to the Proposed Action.

### No Project Alternative B

If No Project Alternative B were selected, there would be no direct or indirect impacts on public health and safety relating to hazardous materials, because the requested ROW application would

be denied, no ROW grant authorized, and the CDCA Plan would be amended to identify the site as unsuitable for any type of solar energy development. No cumulative impacts would be caused or contributed to under this alternative.

#### No Project Alternative C

If No Project Alternative C were selected, there would be no direct or indirect impacts on public health and safety relating to hazardous materials, because the requested ROW application would be denied, no ROW grant authorized. In this case, no cumulative impacts presently would be caused or contributed to under this alternative.

However, under No Project Alternative C, the CDCA Plan would be amended to identify the site as suitable for any type of solar energy development. Accordingly, hazardous materials impacts associated with No Project Alternative C would depend on the solar technology proposed, size of the project and other variables. Impacts similar in nature to those of the Proposed Action could be expected to result from risks and hazards relating to accidents and spills, human health, small quantity hazardous materials, large quantity hazardous materials, construction and emissions. Such impacts could be similar to, greater or less than those of the Proposed Action.

## 4.11.2.3 Discussion of Cumulative Impacts

Impacts resulting from construction, operation, maintenance and decommissioning of the GSEP could result in a cumulative impact relating to hazardous materials, including the use, storage, and transport of hazardous materials, with other past, present, or reasonably foreseeable future actions. For example, cumulative impacts would exist or could result from the interaction of one or more controlled or uncontrolled release of hazardous materials, e.g., airborne or subsurface plumes, within the same geographic area, and during the same timeframe. The geographic area of the cumulative impacts analysis area for hazardous materials management is the general project area, including the sites and the vicinity of the sites. BLM has identified this geographic area as large enough to provide a reasonable basis for evaluating cumulative hazardous materials-related impacts. The relevant timeframe within which incremental impacts could be additive, synergistic or otherwise combine includes the construction period for the Proposed Action, its anticipated 30-40 year lifespan and the period of time required for closure and decommissioning of the GSEP and alternatives.

Existing conditions within the cumulative impacts area reflect a combination of the natural condition and the effects of past actions and are described in Chapter 3. Direct and indirect effects of the GSEP are analyzed above. Past, present and reasonably foreseeable future actions making up the cumulative scenario are identified in Section 4.1.

Relevant past actions include one existing combined-cycle natural gas power plant (i.e., the Blythe Energy Project), two prisons, and other facilities that would continue to manage hazardous materials in the cumulative impacts area during the relevant timeframe. It is expected that these facilities use, store, and/or transport hazardous materials, including aqueous ammonia to control the emissions of NOx in the case of the Blythe Energy Project. However, these facilities are not

expected to contribute incremental hazardous materials management-related impacts that could overlap with those of the Proposed Action within the cumulative impacts area during the relevant timeframe, thereby causing or contributing to a cumulative effect, because they are subject to myriad safeguards, including the laws, ordinances, regulations, and standards (LORS) summarized in Table 1-1, which are intended to prevent uncontrolled releases and to control such releases in the event they occur.

In addition to the Proposed Action, other future foreseeable actions include 12 solar power plants planned along I-10, a combined-cycle natural gas power plant (i.e., Blythe Energy Project II), a communication tower, Eagle Mountain Pumped Storage Project, Eagle Mountain Landfill, a raceway, and several electric transmission infrastructure projects. Five of the 12 solar plants would be thermal and seven would be photovoltaic. Construction of the proposed thermal power plants would cause increases similar to the Proposed Action in the volume of heat transfer fluid and other hazardous materials required for the operation of such plants within the cumulative impacts area. These facilities would require the use, storage, and transport of various types of hazardous materials. Additional hazardous materials management is expected to occur at these facilities; however, these facilities are not expected to contribute incremental hazardous materials management-related impacts that could overlap with those of the Proposed Action within the cumulative impacts area during the relevant timeframe, thereby causing or contributing to a cumulative effect, because each such facility would be subject to the LORS and other safeguards that would prevent uncontrolled releases and to control such releases in the event they occur.

Collectively, the impacts associated with the construction, operation and maintenance, and closure and decommissioning of the GSEP and alternatives is not expected to cause or contribute to cumulative effects relating to hazardous materials management because of the nature of the materials used, compliance with applicable LORS and the engineering and administrative controls that would be implemented to prevent and control accidental releases of hazardous materials. Accordingly, it is unlikely that that a vapor or groundwater plume would mingle (combine) to produce an airborne or waterborne risk to the human environment should an accidental release occur.

### 4.11.2.4 Summary of Mitigation Measures

The implementation of the mitigation measures imposed by the CEC as Conditions of Certification for the GSEP also would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G. The following address impacts on public health and safety:

HAZ-1, HAZ-2, HAZ-3, HAZ-4, HAZ-5, HAZ-6

Public Health-1

SOIL&WATER-18

### 4.11.2.5 Residual Impacts after Mitigation Measures were Implemented

Although unlikely, it is possible that even after the implementation of the Mitigation Measures identified above, an accidental release could occur and could cause an airborne or waterborne risk to the human environment.

### 4.11.2.6 Unavoidable Adverse Impacts

Unavoidable adverse impacts would be the same as the residual impacts described above.

## 4.11.3 Non-hazardous Waste Management

This section presents an analysis of issues associated with wastes generated from the proposed construction and operation of the GSEP. The technical scope of this analysis encompasses solid and liquid wastes existing on site and those to be generated during facility construction, operation, and closure/decommissiong. Management and discharge of wastewater is addressed in Section 4.19. Additional information related to waste management may also be discussed in Section 4.11.2 and 4.11.9.

### 4.11.3.1 Impact Assessment Methodology

Projected wastes were evaluated in terms of landfill capacity and LORS compliance. The federal, state, and local environmental LORS listed in Table 1-1 have been established to ensure the safe and proper management of both solid and hazardous wastes in order to protect human health and the environment.

### 4.11.3.2 Discussion of Direct and Indirect Impacts

#### *Proposed Action*

Construction activities would generate an estimated 40 cubic yards per week of non-hazardous solid wastes, consisting of scrap wood, steel, glass, plastic, and paper, and another 1 cubic yard per week of office-related waste. Of these items, recyclable materials would be separated and removed as needed to recycling facilities. Non-recyclable materials (insulation, other plastics, food waste, roofing materials, vinyl flooring and base, carpeting, paint containers, packing materials, etc.) would be disposed at a Class III landfill.

Non-hazardous liquid wastes would be generated during construction, and would include 200 gallons of sanitary waste per day. Sanitary wastes would be pumped to tanker trucks by licensed contractors for transport to a sanitary water treatment plant. Please see the Section 4.14 and 4.19 for more information on the management of project wastewater.

Anticipated universal waste generated during construction includes: spent batteries (e.g. alkaline dry cell, nickel-cadmium, and lithium ion) and empty or nonempty aerosol cans (per year). Spent batteries and aerosol cans would be recycled by licensed universal waste handlers. Universal waste would be accumulated for less than one year and recycled off-site.

## *Alternatives*

### Reduced Acreage Alternative

If the Reduced Acreage Alternative were selected, a utility-scale solar energy generating facility would be developed on the site that would have approximately 50 percent less generating capacity as the Proposed Action. Types and amounts of non-hazardous solid and liquid wastes would be substantially similar to the Proposed Action, although the amounts required would be less, commensurate with the reduction by one Unit. As a result, attendant public health and safety risks would be comparable to the Proposed Action.

### Dry Cooling Alternative

The Dry Cooling Alternative would significantly reduce the volume of non-hazardous evaporation pond residue estimated to be 50,000 tons every seven years requiring disposal using the wet cooling option. By comparison, with dry cooling, non-hazardous waste is reduced to 8,000 tons removed every twenty years. In addition, the non-hazardous solid waste generated during periodic maintenance of the water treatment filters (spent media of sand, gravel, garnet, anthracite, about 2,100 cubic feet every 5 years) and disposal or recycling of the reverse osmosis filters (approximately 440 cartridges every few months and about 160 RO membrane elements every 3 to 5 years) would be significantly reduced. Consequently, the overall impacts of the Dry Cooling Alternative related to waste management (waste generation and disposal) would be reduced compared to the Proposed Action.

### No Action Alternative A

If No Action Alternative A were selected, there would be no direct or indirect impacts on public health and safety relating to hazardous materials, because the requested ROW application would be denied, no ROW grant authorized, and no amendment of the CDCA Plan would be approved to associate the site with solar energy development at this time. In this case, no cumulative impacts presently would be caused or contributed to under this alternative.

However, No Action Alternative A leaves open the possibility that a subsequent renewable energy facility application could be submitted that would be similar to, greater or less than, the Proposed Action. Depending on the technology proposed, different hazardous materials impacts could result. For example, if “power tower” or PV were proposed for a solar project instead of solar trough technology, no impacts relating the proposed HTF would result because no HTF would be required. Risks and hazards relating to accidents and spills, human health, small quantity hazardous materials, natural gas, construction risks and emissions could be similar to the Proposed Action.

### No Project Alternative B

If No Project Alternative B were selected, there would be no direct or indirect impacts on public health and safety relating to hazardous materials, because the requested ROW application would be denied, no ROW grant authorized, and the CDCA Plan would be amended to identify the site as unsuitable for any type of solar energy development. No cumulative impacts would be caused or contributed to under this alternative.

### No Project Alternative C

If No Project Alternative C were selected, there would be no direct or indirect impacts on public health and safety relating to hazardous materials, because the requested ROW application would be denied, no ROW grant authorized. In this case, no cumulative impacts presently would be caused or contributed to under this alternative.

However, under No Project Alternative C, the CDCA Plan would be amended to identify the site as suitable for any type of solar energy development. Accordingly, hazardous materials impacts associated with No Project Alternative C would depend on the solar technology proposed, size of the project and other variables. Impacts similar in nature to those of the Proposed Action could be expected to result from risks and hazards relating to accidents and spills, human health, small quantity hazardous materials, large quantity hazardous materials, construction and emissions. Such impacts could be similar to, greater or less than those of the Proposed Action.

## 4.11.3.3 Cumulative Impacts

Cumulative impacts can occur within 1-10/Eastern Riverside County area if implementation of the GSEP could combine with those of other local or regional projects. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects and other non-energy projects that have been or are expected to be under consideration by the BLM, the Energy Commission and Riverside County during the life of the Proposed Action, from construction to decommissioning. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land.

The geographic extent for the analysis of the cumulative impacts associated with the GSEP project is Riverside County, the location of the closest large Class III landfills. This geographic scope is appropriate because waste disposal facilities in Riverside County are the ones most likely to be used for disposal of waste generated by the GSEP considering regulatory acceptability and transport costs.

Existing waste management-related conditions within the cumulative impacts area reflect a combination of the natural condition and the effects of past actions and are described in PA/FEIS Chapter 3. Direct and indirect effects of the GSEP, including those associated with the generation of non-hazardous solid waste that would add to the total waste generated in Riverside County, are analyzed above. Past, present and reasonably foreseeable future actions making up the cumulative scenario are identified in Section 4.1. Non-hazardous solid waste generated by past, present, and reasonably foreseeable projects in the cumulative impacts area during the relevant timeframe is summarized in Table 4.11-7, below, and Table 4.1-4, Existing Projects Along the I-10 Corridor (Eastern Riverside County) and also would be disposed of within Riverside County. Most of the reasonably foreseeable projects identified Table 4.1-4 would generate smaller volumes of non-hazardous waste than the GSEP.

**TABLE 4.11-7**
**SUMMARY OF OPERATION WASTE STREAMS AND MANAGEMENT METHODS**

| Waste Stream and Classification[a] | Origin and Composition | Estimated Amount | Estimated Frequency of Generation | Waste Management Method | |
|---|---|---|---|---|---|
| | | | | Onsite | Offsite |
| Used hydraulic fluid, oils and grease – Non-RCRA hazardous | HTF system, turbine, and other hydraulic equipment | 200,000 gallons per year | Intermittent | Accumulated for < 90 days | Recycle |
| Effluent from oily water separation system – Non-RCRA hazardous | Plant wash down area/oily water separation system | 12,000 gallons per year | Intermittent | None | Recycle |
| Oil absorbent, and oil filters – Non-RCRA hazardous | Various | 20 55-gallon drums per month | Intermittent | Accumulated for < 90 days | Sent offsite for recovery or disposal at Class I landfill |
| Dirty shop rags – Recyclable material | Maintenance cleaning operations | 200 pounds per month | Routine | None | Send to commercial laundry for cleaning and recycling |
| Spent carbon – RCRA hazardous | Spent activated carbon from air pollution control of HTF vent | 182,000 pounds per year | Intermittent | Contained in engineered process vessel, no accumulation outside of process | Sent off site for regeneration at a permitted management facility |
| Soil contaminated with HTF (< 10,000 mg/kg) – Non-hazardous | Solar array | 3,000 cy/year | Intermittent | Bioremediation or land farming at LTU | Disposal at permitted waste management facility |
| Spent batteries – Universal waste | Batteries containing heavy metals such as alkaline dry cell, nickel-cadmium, or lithium ion. | <40/month | Continuous | Accumulate for <one year | Recycle |
| Spent batteries – Hazardous (exempt if managed as prescribed by Title 22 CCR Chapter 16). | Lead acid | 80 every two years | Intermittent | Accumulated for <180 days | Recycle |
| Spent fluorescent bulbs or high-intensity discharge lamps – Universal waste | Facility lighting | < 200 per year | Intermittent | Accumulate for <one year | Recycle |
| Spent demineralizer resin – Non-hazardous | Demineralizer | 1,000 cubic feet ($ft^3$) | Once every three years | None | Recycle |
| Reverse Osmosis (RO) Membrane Cleaning Waste – Non-hazardous | Acidic and/or caustic chemicals | 12,000 to 24,000 gallons per cleaning | Up to four times per year | Evaporation ponds | Evaporation Pond solids disposal at permitted waste management facility |
| RO system concentrate – Inert or liquid designated waste – Non-hazardous | Auxiliary cooling tower and boiler blowdown | TBD | Routine | Evaporation ponds | Evaporation Pond solids disposal at permitted waste management facility |
| Auxiliary cooling tower basin sludge – Non-hazardous | Auxiliary cooling tower | 4,000 pounds/ year | Annually | Evaporation ponds | Evaporation Pond solids disposal at permitted waste management facility |
| Spent softener resin – Non hazardous | Softener | 2,000 $ft^3$ | Once every 3 years | None | Recycle |
| Damaged parabolic mirrors – Non-hazardous | Metals and other materials | TBD | Variable | None | Recycle for metal content and/or other materials or send for landfill disposal |
| Sanitary wastewater – Non-hazardous | Toilets, washrooms | 11,000 gallons/ day | Continuous | Septic leach field | None |

[a] Classification under Title 22 CCR Division 4.5, Chapters 11, 12, and 23.

### 4.11.3.4 Cumulative Impacts in the Project Area

A value of 100 cubic yards/MW was used as a rough guide for determining total volume of non-hazardous solid wastes that could result from implementation of all the projects listed in the two tables based on volumes of non-hazardous waste generated by similar facilities. Similar to the proposed projects, these quantities do not include closure or decommissioning wastes; disposal at landfills with adequate capacity would be a condition in facility closure plans. The approximately 450,000 cubic yards generated from projects in the cumulative scenario within the cumulative impacts area compares to the 150,000,000 cubic yards of Riverside County Class III landfill capacity available to these generators (RSA, 2010). The GSEP project wastes would be generated in modest quantities (10 cubic yards or 1 to 2 tons per week), waste recycling would be employed wherever practical, and sufficient capacity is available at several disposal facilities to handle the volumes of wastes that would be generated by the project. The Proposed Action's incremental effective of solid waste disposal is not cumulatively considerable and would have no cumulative impact on existing projects.

### 4.11.3.5 Cumulative Impacts in the California Desert

Implementation of the multiple solar and wind projects proposed to be developed in the California Desert, and other planned non-energy projects, would result in an increase in generation of hazardous and non-hazardous solid and liquid waste and would add to the total quantity of waste generated in throughout the desert. However, GSEP-specific wastes would be recycled wherever practical and sufficient capacity is available throughout the area, especially with the addition of the Mesquite Regional Landfill with a capacity of 600 million tons and scheduled to be fully operational in 2011/2012 (Mesquite Regional Landfill 2010). Therefore, impacts of the GSEP, when combined with impacts of the future solar and wind, and other development projects currently proposed within the California desert would not result in significant adverse and unavoidable cumulative impacts with regard to waste management.

In sum, incremental impacts of the GSEP could combine with impacts of past, present, and reasonably foreseeable projects to result in a contribution to local and regional cumulative impacts related to waste management. The amount of non-hazardous and hazardous wastes generated during construction, operation and closure/decommissioning of the GSEP project would add to the total quantity of hazardous and non-hazardous waste generated in Riverside County. However, sufficient capacity is available at treatment and disposal facilities to handle the volumes of wastes that would be generated by the combined projects. The impacts for the alternatives would vary, and be proportional to the size of the project.

### 4.11.3.6 Summary of Mitigation Measures

Implementation of the mitigation measures imposed by the CEC as Conditions of Certification for the GSEP also would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G. The following address impacts on non-hazardous waste:

WASTE-1, WASTE-2, WASTE-3, WASTE-4, WASTE-5, WASTE-6, WASTE-7, WASTE-8, WASTE-9, WASTE-10, WASTE-11

### 4.11.3.7 Residual Impacts after Mitigation Measures were Implemented

None are expected.

### 4.11.3.8 Unavoidable Adverse Impacts

None are expected.

## 4.11.4 Unexploded Ordnance (UXO)

UXO presents an immediate risk of acute physical injury from fire or explosion resulting from accidental or unintentional detonation. As discussed in Section 3.12, one 50-caliber cartridge was identified during the biological and cultural resources surveys across the GSEP site.

### 4.11.4.1 Impact Assessment Methodology

Review of historical uses of the site, generally-accepted risk information that is widely-available from a multitude of internet sources, and analysis included in the CEC's Revised Staff Assessment all contributed to the analysis of potential UXO-related impacts associated with development of the Proposed Action.

### 4.11.4.2 Discussion of Direct and Indirect Impacts

#### *Proposed Action*

During construction, maintenance, and closure and decommissioning activities associated with the Proposed Action, land disturbance activities could unearth unexploded World War II-era and more recent vintage munitions, including conventional and unconventional land mines, personnel mines, and bullets, the detonation of which would pose a safety risk to the construction workers. For example, surface and shallow sub-surface UXO could be disturbed by vehicles, walkers and excavation using shovels or similar hand tools, and deeper sub-surface UXO could be disturbed by the earth movement and excavation processes that would be required for development of the Proposed Action.

#### *Alternatives*

##### Action Alternatives, No Action Alternative A, and No Project Alternative C

Risks associated with accidental or unintentional detonation of UXO would be equally applicable for all of the alternatives pursuant to which ground disturbance could occur consistent with the CDCA Plan, including No Action Alternative A and No Project Alternative C, regardless of whether such disturbance related to the development of a renewable energy project.

**No Project Alternative B**

Because the selection of Alternative B would not be expected to result in ground disturbance, no UXO-related risks are anticipated to be associated with this alternative.

### 4.11.4.3 Discussion of Cumulative Impacts

Although accidental or unintentional detonation of UXO in the vicinity of the Proposed Action constitutes a continuing risk of immediate, acute physical injury from fire or explosion, the incremental UXO-related risks of projects in the cumulative scenario could not combine in a way that would be additive, countervailing or synergistic. Consequently, there would be no significant UXO-related cumulative impacts associated with the Proposed Action.

### 4.11.4.4 Summary of Mitigation Measures

A program for identifying UXO would be implemented during construction which would be sufficient to ensure proper handling of UXO in the unlikely event of encountering any (GSEP 2009f, Data Response Items 226 and 227).

### 4.11.4.5 Residual Impacts after Mitigation Measures were Implemented

Even with the implementation of the Mitigation Measure identified above, a risk of accidental or unintentional detonation of UXO would remain, resulting in a continuing risk of immediate, acute physical injury from fire or explosion.

### 4.11.4.6 Unavoidable Adverse Impacts

Unavoidable adverse impacts would be the same as the residual impacts discussed above.

## 4.11.5 Abandoned Mined Land (AML)

As stated in Section 3.12.5, there are no abandoned mine openings near or within the GSEP area. Thus, no AML-related direct or indirect impacts would result from the GSEP or alternatives, no mitigation measures would reduce impacts, and no cumulative impacts, residual impacts, or unavoidable adverse impacts on AML would result.

## 4.11.6 Undocumented Immigrants (UDI)

As stated in Section 3.12.6, there are no known incidents with UDI at or near the project area. Thus, no UDI-related direct or indirect impacts would result from the GSEP or alternatives, no mitigation measures would reduce impacts, and no cumulative impacts, residual impacts, or unavoidable adverse impacts on AML would result.

# 4.11.7 Transmission Line Safety and Nuisance

## 4.11.7.1 Impact Assessment Methodology

The potential magnitude of the line impacts of concern depends on compliance with the listed design-related LORS and industry practices (**Table 1-1**). These LORS and practices have been established to maintain impacts below hazard thresholds. Thus, if the Proposed Action would comply with applicable LORS, then it would remain below such thresholds.

## 4.11.7.2 Direct and Indirect Impacts

### *Proposed Action*

This analysis assesses whether the GSEP's transmission line would constitute a public health and safety hazard in the areas around the proposed route as it runs between the site and the Southern California Edison's (SCE's) planned Colorado River Substation 6.5 miles to the east. The power generated by GSEP would be transmitted using an overhead single-circuit 230-kilovolt (kV) line. The SCE substation would be built by SCE under the jurisdiction of the California Public utilities Commission (PUC) and the BLM. Therefore, this analysis focuses on the proposed GSEP tie-in line and the related on-site 230-kV switchyard and not the proposed Colorado River Substation. Since the proposed line would be built and operated within the SCE service area, it would be designed, built, and operated according to SCE's guidelines. The potential impacts of concern in this analysis are those to be encountered along the proposed route and focuses on the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

1. aviation safety;
2. interference with radio-frequency communication;
3. audible noise;
4. fire hazards;
5. hazardous shocks;
6. nuisance shocks; and
7. electric and magnetic field (EMF) exposure.

#### Aviation Safety

The nearest airport to the project and related line is the Blythe Airport approximately 15 miles east of the project and 10 miles east of the proposed tie-in line meaning that the airport would be too far away for the project to pose a collision hazard to area aviation according to FAA criteria. Furthermore, the line support structures would, at less than 145 feet would be significantly less than the 200 feet in height that triggers the FAA concern over collision hazards. Therefore, no mitigation is necessary.

#### Interference with Radio-Frequency Communication

The Proposed Action transmission line would be built and maintained in keeping with standard SCE practices that minimize surface irregularities and discontinuities and related corona noise. Such corona effects would further be minimized by the specific low-corona designs proposed by

the Applicant. Since the line would traverse an uninhabited open space, corona-related radio-frequency interference or related complaints is not anticipated to occur and no mitigation is necessary.

#### Audible Noise

Since the noise level depends on the strength of the line electric field, the potential for perception could be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during rainfall, mainly from overhead lines of 345 kV or higher such as the proposed line. Research by the Electric Power Research Institute (EPRI 1982) has validated the efficacy of available mitigation measures by showing that the fair-weather audible noise from all modern transmission lines even of more than 345 kV would be generally indistinguishable from background noise at the edge of a right-of-way of 100 feet or more. Since the proposed low-corona design is also aimed against surface electric fields, staff does not expect the proposed line operation to add significantly to current background noise levels in the project area. For an assessment of the noise from the proposed line and related facilities, please refer to staff's analysis in Section 4.9.

#### Fire Hazards

Potential fire hazards would be addressed through the related LORS in Table 1-1. Such hazards would be caused by sparks from conductors of overhead lines, or that could result from direct contact between the line and nearby trees and other combustible objects.

#### Hazardous and Nuisance Shocks

Operation of the proposed transmission line could result in hazardous and/or nuisance shocks. For the proposed line, the Applicant would be responsible in all cases for ensuring compliance with these grounding-related practices within the ROW.

#### Electric and Magnetic Field Exposure

While EMF hazards have not been established from the available evidence, the absence of such evidence does not serve as proof of a definite lack of a hazard. Therefore, it is appropriate, in light of present uncertainty, to recommend feasible reduction of such fields without affecting safety, efficiency, reliability, and maintainability of the proposed line.

### *Alternatives*

#### Action Alternatives

Construction and operation of the Reduced Acreage Alternative and Dry Cooling Alternative would have the same transmission line safety and nuisance impacts to those analyzed for the Proposed Action because the transmission line under these alternatives would follow the same route.

#### No Action Alternative A and No Project Alternative C

Under No Action Alternative A, the Proposed Action would not be implemented, but the land on which the GSEP is proposed would become available to other uses that are consistent with BLM's land use plan, potentially including other renewable energy projects. Under No Project Alternative C, the Proposed Action would not be implemented, but BLM would allow for other solar projects on the site. Under these No Action/No Project scenarios, other renewable energy projects may be constructed to meet state and federal mandates, and those projects would likely require transmission lines that would have similar transmission line safety and nuisance impacts to the Proposed Action.

#### No Project Alternative B

Under No Project Alternative B, the Proposed Action would not be implemented and BLM would make the area unavailable for future solar development. Under this No Project scenario, it is expected that the site would remain in its existing condition, with no new structures or facilities constructed or operated on the site. However, it is possible that other uses consistent with the site's CDCA Plan classification could require transmission lines that would have similar transmission line safety and nuisance impacts to the Proposed Action.

### 4.11.7.3 Cumulative Impacts

Incremental impacts of construction, operation, maintenance and decommissioning of the GSEP could contribute to a cumulative effect on transmission line safety and nuisance when considered in combination with additional transmission lines that would be associated with the cumulative projects (see Section 4.1). The cumulative impacts area for potential cumulative transmission line safety and nuisance impacts would be limited to the immediate vicinity of the proposed line. The relevant timeframe within which incremental impacts could interact to cause or contribute to cumulative impacts would begin when the proposed line is erected and would last for as long as the line remains in place. This time period very likely could extend past the point of site closure and decommissioning of the GSEP.

Existing conditions within the cumulative impacts area reflect a combination of the natural condition and the effects of past actions and are described in Chapter 3. Direct and indirect effects of the GSEP and alternatives are analyzed above. Past, present and reasonably foreseeable future actions making up the cumulative scenario are identified in Section 4.1. It is unlikely that transmission lines associated with the cumulative projects would be sited in the immediate vicinity of the transmission line of the Proposed Action. Therefore, cumulative impacts are not anticipated to result from the Proposed Action. None of the alternatives is expected to cause or contribute to any cumulative transmission line safety and nuisance impacts, because, if a line is built pursuant to the alternative, incremental impacts would be the same as those of the Proposed Action and, if no line is built, no line-related impacts would result.

Regarding EMF exposure, when field intensities are measured or calculated for a specific location, they reflect the interactive, and therefore, cumulative effects of fields from all contributing conductors. This interaction could be additive or countervailing, depending on

prevailing conditions. Since the Proposed Action's transmission line would be designed, built, and operated according to applicable SCE field-reducing guidelines (as currently required by the CPUC for effective field management), any contribution to cumulative area exposures should be at levels expected for SCE lines of similar voltage and current-carrying capacity. The action alternatives would contribute to cumulative EMF conditions, as could No Action/No Project Alternative scenarios that might include a transmission line. If no transmission line were developed, pursuit of the alternative would not generate EMF.

### 4.11.7.4 Summary of Mitigation Measures

The implementation of the mitigation measures imposed by the CEC as Conditions of Certification for the GSEP also would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G. The following mitigation measures address impacts on transmission line safety and nuisance:

TLSN-1, TLSN-2, TLSN-3, TLSN-4

### 4.11.7.5 Residual Impacts after Mitigation Measures were Implemented

None are expected.

### 4.11.7.6 Unavoidable Adverse Impacts

None are expected.

## 4.11.8 Traffic and Transportation Safety

### 4.11.8.1 Impact Assessment Methodology

The Traffic and Transportation analysis focuses on:

1. Whether construction and operation of the Genesis Solar Energy Project (GSEP) would result in traffic and transportation impacts

2. Whether the GSEP would be in compliance with applicable LORS (see Table 1-1).

In this analysis potential impacts are identified related to the construction and operation of GSEP on the surrounding transportation systems and roadways, and, when applicable, 6mitigation measures are proposed.

### 4.11.8.2 Direct and Indirect Impacts

#### *Roadway Safety*

In addition to the standard equipment, several pieces of equipment that exceed roadway or size limits would need to be transported to the GSEP site via I-10 during construction. This equipment

includes the steam turbine generator and main transformers. The equipment would be transported using multi-axle trucks from US-95 to I-10.

To transport the equipment, the Applicant must obtain special ministerial permits from Caltrans to move oversized or overweight materials. In addition, the Applicant must ensure proper routes are followed; proper time is scheduled for the delivery; and proper escorts, including advanced warning and trailing vehicles as well as law enforcement control are available, if necessary.

Hazardous materials to be used by GSEP consist of heat transfer fluid (Therminol VP-1™) as well as diesel fuel, mineral insulating oil, and lube oil. Tanker trucks would use I-10 to make deliveries to the site. Federal and state regulations include specific procedures for transporting hazardous materials. See Table 1-1 for information about applicable LORS.

### *Alternatives*

#### Action Alternatives

Construction and operation of the Reduced Acreage Alternative and Dry Cooling Alternative would have similar aviation and roadway safety impacts as those described for the proposed GSEP since the facilities under these alternatives would generally be the same, with only a reduction of one solar unit or a 50 percent reduction in the overall acreage. Therefore, there would be no substantial change in impacts from a roadway safety perspective under these alternatives.

#### No Action Alternative A and No Project Alternative C

Under No Action Alternative A, the site would become available to other uses that are consistent with BLM's land use plan, including another solar project. Under No Project Alternative C, the Proposed Action would not be implemented and BLM would allow for other solar projects on the site. Under these No Action/No Project scenarios, other renewable energy projects could be constructed to meet state and federal mandates, and those projects would likely require construction activities and facilities that would have similar aviation and roadway safety impacts to the Proposed Action.

#### No Project Alternative B

Under No Project Alternative B, the Proposed Action would not be implemented and BLM would make the area unavailable for future solar development. Under this No Project scenario, it is expected that the site would remain in its existing condition, with no new structures or facilities constructed or operated on the site. However, other uses consistent with the CDCA Plan use classification could be developed on the site. Such other uses could cause similar, greater or lesser aviation and roadway safety impacts than the Proposed Action.

## 4.11.8.3 Cumulative Impacts

Incremental traffic and transportation-related safety impacts resulting from construction, operation, maintenance and decommissioning of the GSEP could result in a cumulative effect in

combination with past, present, or reasonably foreseeable future actions. The cumulative impacts area for traffic and transportation-related safety consists of the I-10 corridor. This geographic scope of cumulative impacts analysis was established based on the natural boundaries of the affected resources, i.e., where on-road traffic and transportation impacts of the Proposed Action could occur. Existing conditions within the cumulative impacts area reflect a combination of the natural condition and the effects of past actions and are described in Chapter 3. Direct and indirect effects of the GSEP and alternatives are analyzed above. Past, present and reasonably foreseeable future actions making up the cumulative scenario are identified in Section 4.1. Within the cumulative impacts area for traffic and transportation-related safety, there are 13 solar projects proposed along the I-10 corridor predominantly between Desert Center and Blythe. Based on the currently available data for these various projects (information obtained from Plans of Development and other project documents), and assuming all projects move forward, these projects would be under construction in the same general time frame as the Proposed Action (2011 to 2016). Other types of projects also could proceed during this timeframe and, thereby, affect the I-10 corridor.

Of these projects, two, in addition to the Proposed Action, are parabolic trough projects (i.e., the Blythe and Palen Solar Power Projects). Each would be anticipated to contribute incremental impacts that are similar in type, duration and intensity as the Proposed Action.

### 4.11.8.4 Summary of Mitigation Measures

The implementation of the mitigation measures imposed by the CEC as Conditions of Certification for the GSEP also would avoid or reduce impacts. These mitigation measures are set forth in Appendix G. The following mitigation measures address impacts on transportation safety:

TRANS-1 TRANS-2, TRANS-3, TRANS-4, TRANS-5

### 4.11.8.5 Residual Impacts after Mitigation Measures were Implemented

None are expected.

### 4.11.8.6 Unavoidable Adverse Impacts

None are expected.

## 4.11.9 Worker Safety and Fire Protection

### 4.11.9.1 Impact Assessment Methodology

Two issues are assessed in Worker Safety-Fire Protection:

1. The potential for impacts on the safety of workers during demolition, construction, and operations activities, and

2. Fire prevention/protection, emergency medical response, and hazardous materials spill response during demolition, construction, and operations.

Worker safety issues are thoroughly addressed by Cal/OSHA regulations. If all LORS are followed, workers will be adequately protected.

Regarding fire prevention matters, the on-site fire-fighting systems proposed by the Applicant have been analyzed and the time needed for off-site local fire departments to respond to a fire, medical, or hazardous material emergency at the proposed power plant site. If on-site systems do not follow established codes and industry standards, additional measures would be recommended. The local fire department capabilities and response time in each area have been reviewed and interviews have been conducted with local fire officials to determine if they feel adequately trained, manned, and equipped to respond to the needs of a power plant.

Other workplace hazards that could be associated with the Proposed Action are less traditionally industrial, and more specific to the nature of a utility-scale solar energy generation plant. This solar power plant would provide a work environment that includes a solar field located in the high desert. The solar field features thousands of mirrors that heat a heat transfer fluid (HTF) to approximately 750°F. The pipe containing the HTF will reach temperatures at the mirror focal point as high as 1,100 °F. Experience at existing solar generating stations shows that these mirrors break, the pipes age, and HTF can leak and catch fire from ball joints or frayed flex hoses. The area under the solar arrays must be kept free from weeds and thus herbicides will be applied as necessary. Exposure to workers via inhalation and ingestion of dusts containing herbicides poses a health risk. Finally, workers will inspect the solar array for HTF leaks and broken mirrors at least once each day by driving up and down dirt paths between the rows of mirrors and even under the mirrors. Cleaning the mirrors will also be conducted on a routine schedule. All these activities will take place year-round and especially during the summer months of peak solar power generation, when outside ambient temperatures routinely reach 115°F and above.

Consequently, it would be particularly important for the Applicant to have well-defined policies and procedures, training, and hazard recognition and control at GSEP facilities to minimize such hazards and protect workers. If the GSEP complies with all applicable LORS (Table 1-1), workers would be adequately protected from health and safety hazards.

### Construction Safety and Health Program

Workers at the GSEP would be exposed to hazards typical of construction, operation and decommissioning of a solar thermal electric power generating facility.

Construction Safety Orders are published at Title 8 California Code of Regulations sections 1502, et seq. These requirements have been promulgated by Cal/OSHA, would apply to the construction phase of the Proposed Action, and would require the development of a Construction Safety and Health Program. Such a program would include the following:

1. Construction Injury and Illness Prevention Program (8 CCR 1509)

2. Construction Fire Prevention Plan (8 CCR 1920)
3. Personal Protective Equipment Program (8 CCR 1514 — 1522)
4. Emergency Action Program and Plan

Additional programs under General Industry Safety Orders (8 CCR 3200-6184), Electrical Safety Orders (8 CCR 2299-2974) and Unfired Pressure Vessel Safety Orders (8 CCR 450-544) would include:

1. Electrical Safety Program
2. Motor Vehicle and Heavy Equipment Safety Program
3. Forklift Operation Program
4. Excavation/Trenching Program
5. Fall Protection Program
6. Scaffolding/Ladder Safety Program
7. Articulating Boom Platforms Program
8. Crane and Material Handling Program
9. Housekeeping and Material Handling and Storage Program
10. Respiratory Protection Program
11. Employee Exposure Monitoring Program
12. Hand and Portable Power Tool Safety Program
13. Hearing Conservation Program
14. Back Injury Prevention Program
15. Ergonomics Program
16. Heat and Cold Stress Monitoring and Control Program
17. Hazard Communication Program
18. Lock Out/Tag Out Safety Program
19. Pressure Vessel and Pipeline Safety Program
20. Solar Components Safe Handling Program

#### Operations and Maintenance Safety and Health Program

Prior to the start of operations at GSEP, the Operations and Maintenance Safety and Health Program would be prepared. This operational safety program would include the following programs and plans:

1. Injury and Illness Prevention Program (8 CCR 3203)
2. Fire Protection and Prevention Program (8 CCR 3221)
3. Personal Protective Equipment Program (8 CCR 3401-3411)
4. Emergency Action Plan (8 CCR 3220)

In addition, the requirements under General Industry Safety Orders (8 CCR 3200-6184), Electrical Safety Orders (8 CCR 2299-2974) and Unfired Pressure Vessel Safety Orders (8 CCR 450-544) would apply to the Proposed Action. Written safety programs for GSEP, which the Applicant would develop, would ensure compliance with the above-mentioned requirements and would assure that the impacts that otherwise could occur would be avoided or sufficiently minimized.

### Safety and Health Program Elements

Elements for both a Construction Safety and Health Program and an Operations Safety and Health Program are described above. The measures in these plans are derived from applicable sections of state and federal law. Both safety and health programs would be comprised of six more specific programs and would require major items detailed in the following paragraphs.

### Injury and Illness Prevention Program

The IIPP would include the following components as presented in the AFC (GSEP 2009a, Section 5.14.2):

1. Identity of person(s) with authority and responsibility for implementing the program;
2. Safety and health policy of the plan;
3. Definition of work rules and safe work practices for construction activities;
4. System for ensuring that employees comply with safe and healthy work practices;
5. System for facilitating employer-employee communications;
6. Procedures for identifying and evaluating workplace hazards and developing necessary program(s);
7. Methods for correcting unhealthy/unsafe conditions in a timely manner;
8. Safety procedures; and
9. Training and instruction.

### Fire Protection

Although the need for fire department response to solar power plants is not expected to be frequent, experience has shown that there is a significant chance that response needs could arise. Development of the Proposed Action would be subject to requirements of the Riverside County Fire Department (RCFD), including access requirements. Further, implementation of the Proposed Action could require response or assistance from the RCFD's hazardous materials response team, advanced life support/ paramedic services, or disaster preparedness and response during construction, operation and maintenance, or closure and decommissioning. The number of workers on site or traveling to and from the site for the project, and thereby could require RCFD assistance, is discussed in Section 4.13, Social Economics. The types of hazards that could trigger the need for an RCFD response are discussed above. The Applicant would develop and implement a fire prevention program for the GSEP and would be required to fund capital improvements and staffing for the RCFD. The Applicant also has coordinated with the Riverside County Fire Department to establish the level of fire-related risk that would be associated with the GSEP and to determine the appropriate level of response capability commensurate with that risk and consistent with applicable safety regulations. Based on this planning and coordination, the Proposed Action would not be expected to cause access-related difficulties for the RCFD or adversely affect its response capability.

Further, compliance with applicable LORS would avoid or reduce the potential for workplace accidents that otherwise would require emergency responders. For example, California

regulations applicable to the Proposed Action would require the Applicant to prepare an Operations Fire Prevention Plan (8 CCR 3221) to determine general program requirements (scope, purpose, and applicability) and potential fire hazards; to develop good housekeeping practices, proper handling and materials storage, potential ignition sources and control measures for these sources, and the persons who would be responsible for equipment and system maintenance; to locate portable and fixed fire-fighting equipment in suitable areas; to establish and determine training and instruction requirements; and to define recordkeeping requirements. Applicable regulations also would require preparation of a Personal Protective Equipment (PPE) and first aid supplies whenever hazards are present that, due to process, environment, chemicals or mechanical irritants, can cause injury or impair bodily function as a result of absorption, inhalation, or physical contact (8 CCR 3380-3400). All safety equipment would have to meet National Institute of Safety and Health (NIOSH) or American National Standards Institute (ANSI) standards, and would carry markings, numbers, or certificates of approval. Respirators would meet NIOSH and Cal/OSHA standards. Each employee would be provided with the following information pertaining to the protective clothing and equipment: Proper use, maintenance, and storage; when to use the protective clothing and equipment; benefits and limitations; and when and how to replace the protective clothing and equipment. Compliance with the PPE Program would ensure that the Applicant complies with applicable PPE requirements and provides employees with the information and training necessary to protect them from potential workplace hazards. Further, applicable regulations would require an Emergency Action Plan (8 CCR 3220), which would outline an emergency action plan (GSEP 2009a, Section 5.14.1). It is expected that the Emergency Action Plan would identify roles and responsibilities; determine emergency incident response training; develop emergency response protocols; specify evacuation protocols; define post emergency response protocols; and determine notification and incident reporting. Additional LORS) called *safe work practices* would apply to the Proposed Action. Both the Construction and the Operations Safety Programs would address safe work practices under a variety of programs. The components of these programs would include, but not be limited to, the programs discussed above. Employee safety training would include safe work practices.

## *Alternatives*

### Action Alternatives

Construction and operation of the Reduced Acreage Alternative and Dry Cooling Alternative would have similar worker safety impacts as those described for the Proposed Action since the facilities under these alternatives would generally be the same, with only a reduction of one solar unit or a 50 percent reduction in the overall acreage. Therefore, there would be no substantial change in impacts associated with worker safety under these alternatives.

### No Action Alternative A and No Action Alternative C

Under No Action Alternative A, the site would become available to other uses that are consistent with BLM's land use plan, potentially including another solar project. Under No Project Alternative C, the Proposed Action would not be implemented and BLM would allow for other solar projects on the site. Under these No Action/No Project scenarios, other renewable energy

projects could be constructed to meet state and federal mandates, and would likely require construction activities and facilities that would have similar worker safety impacts to the Proposed Action.

#### No Project Alternative B

Under No Project Alternative B, the site would be unavailable for future solar development. Under this No Project scenario, it is expected that the site would remain in its existing condition. However, other uses consistent with the CDCA Plan multiple use classification could be developed or occur. Such other activities could cause similar, greater or lesser worker safety impacts relative to the Proposed Action.

## 4.11.9.2 Cumulative Impacts

Incremental worker safety-related impacts of the GSEP would result in a risk level that would remain below thresholds of concern and, therefore, would not cause or contribute to any cumulative effect on worker safety. Regardless of the level of solar development or acreage developed under either of the action alternatives, the utility-scale solar energy development that would result would be subject to the same worker safety requirements as the Proposed Action and, therefore, also would not result in a risk level that could cause or contribute to any cumulative effect on such safety. The No Action/No Project Alternatives are not expected to require workers, and so would not be expected to affect worker safety.

For the fire safety-related issues of emergency medical and hazardous materials spill response, the incremental impacts of the GSEP could result in a cumulative effect when combined with the incremental impacts of other projects in the cumulative scenario. More specifically, a cumulative Worker Safety/Fire Protection impact would occur in the event of a simultaneous need for a fire department to respond to multiple locations such that its resources and those of the mutual aid fire departments (which routinely respond in every-day situations to emergencies at residences, commercial buildings, and heavy industry) are over-whelmed and cannot effectively respond. For purposes of this analysis, the cumulative impacts area for fire safety-related resources consists of the RCFD's service area. Potential cumulative fire safety-related effects could occur over the course of 40 or more years, encompassing the entire lifespan of the GSEP, from construction and operation and maintenance, through closure and decommissioning, since people could be on, or en route to, the site throughout this timeframe.

Existing conditions within the cumulative impacts area reflect a combination of the natural condition and the effects of past actions and are described in Chapter 3. Direct and indirect effects of the GSEP are analyzed above. Past, present and reasonably foreseeable future actions making up the cumulative scenario are identified in Section 4.1 and include existing locations that might require a fire department response as well as facilities proposed for construction, operation or demolition. Any such location within the cumulative impacts area could require response from off-site fire departments for fire, hazardous materials, or emergency medical service emergencies. Cumulative impacts could occur despite the many safeguards implemented to both prevent and control fires, hazardous materials releases, and injuries/accidents, because of the great distances

involved in response and expansive sites. Although the chances of two or more solar power plants requiring emergency response simultaneously may be low, a response to one distant site could impede or preclude a simultaneous response to another solar plant, residential or commercial location, or other location in demand. However, while cumulative impacts theoretically are possible, they are not likely given the 14-stations located within the RCFD's service area and mutual aid agreements. Emergency response capabilities would be adequate.

### 4.11.9.3 Summary of Mitigation Measures

The implementation of mitigation measures imposed by the CEC as Conditions of Certification for the GSEP also would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G. The following would address impacts on worker safety/fire safety:

> WORKER SAFETY-1, WORKER SAFETY-2, WORKER SAFETY-3, WORKER SAFETY-4, WORKER SAFETY-5, WORKER SAFETY-6, WORKER SAFETY-7, WORKER SAFETY-8, WORKER SAFETY-9

### 4.11.9.4 Residual Impacts after Mitigation Measures were Implemented

None are expected.

### 4.11.9.5 Unavoidable Adverse Impacts

None are expected.

## 4.11.10 Public and Private Airstrips/Airfields

As stated in Section 3.12.10, the nearest public airstrip is located approximately 15 miles east of the GSEP site. Thus, no aviation-related direct or indirect impacts would result from the GSEP or alternatives, no mitigation measures would reduce impacts, and no cumulative impacts, residual impacts, or unavoidable adverse impacts on aviation would result.

## 4.11.11 Geologic Hazards

### 4.11.11.1 Impact Assessment Methodology

The Proposed Action and alternatives are evaluated qualitatively in terms of their susceptibility to geologic and seismic hazards. Potential effects on these resources are assessed based upon existing publications and maps completed by regulatory agencies, such as the United State Geological Survey, California Geologic Survey, California Division of Mines and Geology and geotechnical engineers who have evaluated the site. The potential for damage to proposed structures or increased risk of injury due to geologic hazards is analyzed using available data from the aforementioned sources. In addition, the conclusions and recommendations provided in the geotechnical investigation are evaluated, and, where appropriate, incorporated into the

analysis. Ground shaking, expansive soils, and hydrocompaction represent the main geological hazards at the proposed site.

The following issues were considered in the analysis of impacts related to geology and soils for the proposed action and each alternative:

1. Accelerated and/or environmentally harmful soil erosion;

2. Damage to project elements or increased exposure of the public to risks from rupture of a known earthquake fault;

3. Injury, death, or property damage as a result of earthquake induced ground deformations (e.g. lateral spreading, subsidence, liquefaction, or collapse), or otherwise unstable soils;

4. Injury, death, or property damage as a result of an onsite or offsite landslide;

## 4.11.11.2 Impact Analysis

### *Proposed Action*

#### Groundshaking

The occurrence of relatively large earthquakes in the Mojave region demonstrates that the site is likely to be subject to moderately intense earthquake-related ground shaking in the future over the life of the GSEP. The anticipated level of shaking, based on the estimated peak ground acceleration (PGA) value at the site (see Section 3.12.11) could result in slight damage to older structures and would not likely result in damage to newer structures built according to current design standards. Several laws and policies impose stringent seismic safety requirements on the design and construction of new structures (see **Table 1-1**). While ground-shaking at the site would not constitute a major effect, mitigation should be implemented to the extent practical through structural designs consistent with the California Building Code and the site-specific geotechnical report that would be required for the GSEP to minimize risks associated with severe ground-shaking.

#### Secondary Earthquake Hazards.

Because the ground water table is greater than 40 feet deep across the property, and the shallow granular soils are very dense, the potential for liquefaction-induced settlement beneath the site during moderate seismic events is considered to be very low. Measures to mitigate significant damage due to liquefaction should be presented in a design-level, site-specific geotechnical report.

Because the proposed GSEP site is not subject to catastrophic liquefaction-induced settlement, the potential for lateral spreading during seismic events would be negligible due to the low relief and very shallow slopes at the proposed site surface. Lateral spreading potential on the proposed GSEP site should be addressed in a design-level project geotechnical report.

### Subsidence and Settlement

The potential for local or regional ground subsidence resulting from petroleum, natural gas, or ground water extraction is considered to be very low. Local subsidence or settlement may also occur when areas containing compressible soils are subjected to foundation or fill loads. The relative density of site granular soils was determined to be very dense based on available penetration resistance blow counts in the preliminary geotechnical investigation (GSEP 2009f). Very dense soils are unlikely to experience significant subsidence due to foundation loading.

### Hydrocompaction

The initial site geotechnical investigation indicates that subsurface alluvial deposits which underlie the proposed project linears contain soils that may experience hydrocompaction (GSEP 2009f). The final geotechnical site evaluation should further investigate the potential for hydrocompaction within the proposed project site and along its linears and, if necessary, provide design parameters necessary to mitigate hydrocompaction issues.

### Expansive Soils

The preliminary geotechnical evaluation indicates near-surface soils at the proposed site are composed of granular soils with a low content of non-plastic fines, which are not considered to be expansive (GSEP 2009a). However, expansive clay soils were encountered at relatively shallow depths in the single boring located 1.5 miles west of proposed construction and could be present at shallow depths beneath the site. A site-specific, design-level geotechnical site investigation would further evaluate the presence of expansive soils within the proposed project site and along its linears and, if necessary, will provide routine design recommendations to mitigate expansive soil issues (GSEP 2009a).

### Erosion

The preliminary stages of construction, especially site grading, excavation, and soil stockpiling would leave loose soil exposed to the erosive forces of rainfall and high winds. Because soil surface disturbance for the proposed project would be greater than one acre, specific erosion control measures would be identified as part of the National Pollutant Discharge Elimination System (NPDES) General Construction permit and Storm Water Pollution Prevention Plan (SWPPP) required for construction. During construction, erosion control measures would be implemented that utilize Construction Water Quality Best Management Practices (BMPs) to avoid or minimize soil erosion and off-site sediment transport. Examples of typical construction BMPs include scheduling or limiting activities to certain times of the year, in particular to avoid flash floods; installing sediment barriers such as silt fence and fiber rolls along the perimeter of the active construction area; maintaining equipment and vehicles used for construction; and developing and implementing a spill prevention and cleanup plan. The SWPPP (and associated BMPs) would be prepared and implemented prior to commencing construction, and BMP effectiveness would be ensured through the sampling, monitoring, reporting, and record keeping requirements contained in the construction general permit. In addition, the general construction permit required under the NPDES program would require that the topsoil be preserved in areas requiring grading in order to ensure proper implementation of post-construction BMPs for site

restoration. Therefore, substantial or accelerated soil erosion or loss of topsoil during and following construction would be minor.

In sum, the main geologic hazards at this site include ground shaking, earthquake inducted settlement, hydrocompaction, expansive soils, and erosion. These potential hazards could be mitigated effectively through facility design by incorporating recommendations contained in a design-level geotechnical report.

## *Alternatives*

### Action Alternatives

The geologic units that would be disturbed by the Reduced Acreage Alternative and Dry Cooling Alternative are the same as those that would be disturbed by the Proposed Action. Each of the action alternatives would have similar geographic and physical relationship of faults and major geologic features. The main geologic hazards for each of the action alternatives would include ground shaking, hydrocompaction, earthquake induced settlement, expansive soils, and erosion. Therefore, no changes to the levels of impact, beyond those discussed for the proposed action, would be anticipated for either the Reduced Acreage Alternative or Dry Cooling Alternative.

### No Action Alternative A

If No Action Alternative A were selected, the construction and operational impacts of the GSEP would not occur. There would be no grading of the site and no installation of power generation and transmission equipment. Geologic hazards would not affect public health and safety under No Action Alternative A.

### No Project Alternative B

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, impacts related to geology could result from the construction and operation of a solar technology and would likely be similar to the impacts from the Proposed Action. Different solar technologies require different amounts of grading and maintenance; however, it is expected that all the technologies would require some grading and maintenance. As such, No Project Alternative B could result in impacts similar to those of the Proposed Action.

### No Project Alternative C

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the geologic conditions of the site would not be expected to change noticeably from existing conditions and, as such, No Project Alternative C would not result in impacts to geologic resources that could occur during construction of the Proposed Action. However, in the absence of the GSEP, other renewable energy projects could be constructed to meet State and Federal mandates, and could have similar, or greater or lesser, impacts than the Proposed Action depending on their ultimate location.

## 4.11.11.3 Cumulative Impacts

Impacts resulting from construction, operation, maintenance and decommissioning of the GSEP could result in a cumulative effect in connection with geologic resources and hazards with other past, present, or reasonably foreseeable future actions. Impacts associated with strong ground shaking and earthquake-induced settlement, hydrocompaction, and expansive soils are not cumulative in nature and would not add to potential cumulative impacts to the facility. Potential cumulative effects on geologic resources and hazards could occur at any time during the lifespan of the GSEP, from construction to decommissioning.

Existing conditions within the cumulative impacts assessment area of geologic resources and hazards reflect a combination of the natural condition and the effects of past actions and are described in Chapter 3. Direct and indirect effects of the GSEP are analyzed above. Briefly, however, the construction of the GSEP is not expected to require any significant amount of groundwater pumping; thus, impacts to regional subsidence are not expected. Construction of the GSEP is expected to cause minor and temporary contribution to erosion. The operation of the GSEP is expected to result in about a 200-ac-ft/yr increase in annual groundwater pumping. Since operation of the GSEP would only contribute a minor amount of additional groundwater withdrawal to the overall amount in the Chuckwalla Valley groundwater basin and since this cumulative amount is only a fraction of historic pumping levels that did not result in any documented subsidence, operation of the GSEP is not expected to impact regional subsidence in the Chuckwalla groundwater basin. Operation of the GSEP is not expected to require any significant excavation or grading such that cumulative impacts to soil resources are not expected. Finally, decommissioning of the GSEP is not expected to require any significant amount of groundwater pumping; impacts to regional subsidence are not expected. Decommissioning of the GSEP would include excavation and grading at the site. Compliance with the required NPDES General Construction Permit and proper implementation of applicable BMPs would insure that any erosion impacts are minor.

Past, present and reasonably foreseeable future actions making up the cumulative scenario are identified in Section 4.1. Although minor, the GSEP could contribute to cumulative geologic resource and hazard conditions.

### *Subsidence and Settlement*

The cumulative change in storage over the construction and operational period (33 years) would amount to approximately -57,000 af, which would equate to less than 0.5 percent of the total amount of the estimated total recoverable groundwater in storage (15,000,000 af). However, the amount of water that is storage (estimated to be as much as 15,000,000 af) in the basin greatly exceeds the amount of cumulative overdraft (57,000 af). Additional information on groundwater withdrawal is contained in Section 4.19, Water Resources.

### *Erosion*

Erosion resulting from implementation of past, present and reasonably foreseeable projects could result in impacts to soil and water resources. Increased development and areas covered with

impervious surfaces in the vicinity of the GSEP could result in decreased stormwater infiltration. Decreased infiltration corresponds to increased runoff and erosion potential. Stormwater quality is regulated under the NPDES program. It is expected that all development projects in the vicinity of the GSEP would have to comply with NDPES program requirements, regardless of whether they fall under the primary jurisdiction of a federal, state or local agency. As a result, each project would implement BMPs, such as those discussed above, during and after construction in order to minimize erosion. Therefore, no substantial cumulative contribution to erosion is expected to result from the cumulative projects, including the GSEP.

Based on the above discussion, the potential for adverse cumulative impacts to the Proposed Action from geologic hazards during the project's design life is negligible and that the potential for impacts to geologic resources is very low. For the reasons discussed above, impacts of alternatives to the GSEP could contribute to cumulative geologic conditions and hazards in proportion to the extent to which they affect such conditions.

### 4.11.11.4 Summary of Mitigation Measures

Implementation of the mitigation measures imposed by the CEC as Conditions of Certification for the GSEP also would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G. The following address impacts associated with geologic hazards:

CIVIL-1, CIVIL-2, CIVIL-3, CIVIL-4

STRUC-1

SOIL&WATER-1

### 4.11.11.5 Residual Impacts after Mitigation Measures were Implemented

None are expected.

### 4.11.11.6 Unavoidable Adverse Impacts

None are expected.

# 4.12 Impacts on Recreation

## 4.12.1 Impact Assessment Methodology

The GSEP is analyzed for its effects on recreational resources by assessing the impacts to land acreage as well as types of known recreational uses including hiking, backpacking and long term camping.

## 4.12.2 Discussion of Direct and Indirect Impacts

### Proposed Action

For impacts to OHV users see Section 4.16 *Impacts on Transportation and Public Access – Off-Highway Vehicle Resources*.

Dispersed recreational activities and experiences on approximately 1746 acres within the footprint of the proposed action would be eliminated. While camping has not been observed in the project area by BLM Rangers, day users, hikers and RV campers would no longer be able to use the area if such recreation were desired. Construction associated noise, fugitive dust, truck and other vehicle movement, and visual intrusions may also impact visitors off-site but nearby, seeking experiences in a natural setting. Recreationists may compensate by substituting other desert lands in the vicinity for their recreational experiences and benefits. This could lead to higher user levels on adjacent public lands open for recreation use. Given the low recreation use on adjacent lands with similar resources or opportunities, additional impacts from displacement would be minimal. However, impacts may include habitat fragmentation, soil compaction, higher noise levels, and fugitive dust from their vehicles. The remaining open space leading to degradation of native vegetation, habitat fragmentation, soil compaction, higher noise levels, and fugitive dust from their vehicles.

The glint and glare from the solar troughs could draw the attention of recreation users, especially those who recreate on higher elevation lands in the wilderness areas and Areas of Critical Environmental Concerns (ACECs) that fall within the viewshed of the proposed action.

The Mule Mountains Long Term Visitor Area (LTVA) is located approximately 13 miles south of the site. Users coming to this LTVA are seeking opportunities for socialization with similar users in a semi-rural environment. The LTVA is at a great distance from the proposed action and is not within the viewshed of the proposed action. Thus, visitors would not be impacted by any degradation of air quality, such as fugitive dust, that may occur during construction.

It is anticipated that some construction crew members would reside in RV campers or trailers on public lands during the construction phase of the project. Although the BLM offers developed campgrounds within commuting distance of the project, only the LTVAs allow long-term camping. The Corn Springs Campground has nine sites and one group campground, all with a 14 day limit and camping is limited to the designated sites, thus would not be available for worker's use. The Midland and Mule Mountains LTVAs allow camping up to seven months

(September 14 to April 16) with a special use permit. Outside of these dates, the camping limit is 14 days. Depending on the number of authorized workers using the LTVA, use could impact the social setting or the physical infrastructure of the LTVA. However, the LTVAs are designed with minimal facilities given that campers must use self-contained RVs and there are no assigned or designated sites, except for the Wiley's Well and Coon Hollow Campgrounds within the Mule Mountain LTVA. Midland LTVA is 135 acres and averages 41 permits per year. Mule Mountain LTVA is 2,805 acres with an average of 135 permits per year. Except for the designated campsites at Wiley's Well and Coon Hollow, each LTVA can accommodate several hundred RV units with a minimum distance of 15 feet between units, which is well in excess of current use.

Impacts to LTVA's from maximum authorized use by construction workers would be to the social and recreation experience of winter users. If the LTVA's were used to a level that spacing and relative solitude is reduced, seasonal long-term visitors may move to other LTVA's in Arizona or Imperial County, thereby compounding crowding at these already popular sites. If there is significant use of the LTVA's by workers, then the BLM may need to increase law enforcement patrols at the LTVA's, thus reducing patrols on public lands elsewhere.

Impacts associated with the operation and maintenance of the additional acres could affect the recreational experience by increasing the acreage of intrusion into the area by utility-scale energy development with an almost industrial presence. Closure impacts associated with closure and decommissioning would likely be more beneficial on recreational values, since additional acres would be reclaimed and, thereby, made available for active or passive recreational use.

## Alternatives

### *Reduced Acreage Alternative*

If this alternative were selected, the only difference with regard to direct and indirect effects relative to the proposed action would correlate directly to the reduction of 50 percent of the proposed surface disturbance. Impacts associated with related noise and fugitive dust during construction, operations, maintenance and decommissioning would decrease based on the reduced acreage of the panels for the Reduced Acreage Alternative.

### *Dry Cooling Alternative*

This alternative would result in the same direct and indirect effects as the proposed action because it would generally be constructed within the same footprint as the proposed action and would result in the same number of workers as the proposed action.

### *No Action Alternative A*

If No Action Alternative A were selected, none of the anticipated recreation-related impacts of the proposed action would occur. Instead, the land on which the GSEP is proposed would become available to other uses consistent with CDCA Plan use opportunities, potentially including another renewable energy project. Thus, impacts of this alternative on recreation could be substantially similar to the proposed action.

### *No Project Alternative B*

If No Project Alternative B were selected, the CDCA Plan would be amended to make the site unavailable for future solar development. Other use opportunities consistent with the CDCA Plan would remain available. Thus, recreation-related-impacts of this alternative would vary from no impacts (e.g., if the site were left in its existing condition and no structures built that might affect the recreational opportunities or experiences available from adjacent properties) to substantial impacts (e.g., if a more intense or intrusive use were made depending on what use ultimately remain in its existing condition, with no new structures or facilities constructed or operated on the site). Generally, for the two no project alternatives, there would be no direct or indirect impacts the recreational opportunities and experiences.

### *No Project Alternative C*

If the No Project Alternative C, which would deny the ROW and amend the CDCA to find the proposed action area as suitable for any type of solar energy development, recreation opportunities would be impacted to the same degree and extent as the proposed action. For example, if the acreage of the future solar energy developed is 50 percent less and the technology is similar to the GSEP, then impacts to recreation opportunities would be 50 percent less. However, different solar technologies in the future could present different impacts on the recreational opportunities.

## 4.12.3 Discussion of Cumulative Impacts

In addition to the proposed GSEP, there are many past, present, or reasonably foreseeable future actions that contribute to impacts in recreation and visual sections. Development of highway access to the region has provided direct vehicular access to open desert scenery for residents throughout Southern California. This increased access improved the recreational experience for some users by making the area more accessible and detracted from the recreational experience for other users who preferred remote camping, hiking, and hunting away from populated areas. Numerous energy-related development projects, including the proposed action, would remove large acreages of land from existing or potential recreational use that would result in some users seeking out other areas of the desert for their activities, experiences, and benefits. However, most of the proposed projects are in areas with low recreation use or potential future opportunities. In some cases, the facilities themselves may become local or regional attractions for travelers or sightseers, especially if the projects include interpretive sites or visitor facilities. This would be a change in type of use, but could result in a net gain for recreation opportunities.

Although the proposed action's effects on recreation would be low for the GSEP area, the combined effect of the overall cumulative past, present, and proposed and reasonably foreseeable projects in eastern Riverside County would result in a change to recreation opportunities and experiences of users, communities, and regional populations.

## 4.12.4 Summary of Mitigation Measures

The following mitigation measures would be imposed by the BLM to avoid or reduce impacts on the quality of the human environment. The following mitigation measures would avoid or minimize impacts on recreation:

*BLM-REC-1*: The Applicant shall prepare and distribute interpretative materials to users of the Mule Mountains LTVA's, Wiley Wells and Coon Hollow Campgrounds, and BLM kiosks stating the development of the solar facilities at the GSEP site and the temporary or permanent closure of the OHV route and related recreational experiences on approximately 1,746 acres of public land. The BLM authorized officer shall approve the draft materials prior to distribution.

*BLM-REC-2*: The Applicant shall engage residents of Lake Tamerisk/Desert Center/Blythe, recreation user groups, interested public, organizations, and agencies to identify specific recreation management prescriptions to provide alternative recreational opportunities and experiences on the lands outside the GSEP site boundary. This effort shall delineate what BLM and its partners would do to provide any additional management, marketing, monitoring, and administrative actions to meet recreational benefit demands for this area.

*BLM-REC-3*: No less than 60 days prior to construction, the Applicant shall coordinate construction activities and the GSEP construction schedule with the authorized officer for the recreation areas impacted. The Applicant shall schedule construction activities to avoid heavy recreational use periods in coordination with and at the discretion of the authorized officer. The Applicant shall locate construction equipment to avoid temporary preclusion of recreation areas in accordance with the recommendation of the authorized officer. The Applicant shall document its coordination efforts with the authorized officer and provide this documentation to the Lead Agencies and affected jurisdictions at least 30 days prior to construction.

*BLM-REC-4*: The Applicant shall coordinate with the authorized officer for the applicable federal, State, or local parks and recreational facilities at least 60 days before construction in order to identify alternative recreation facilities that may be used by the public during construction. The Applicant shall post a public notice at recreation facilities that are to be closed or where access would be limited during project construction. The Applicant shall document its coordination efforts with the parks and recreation departments and provide this documentation to the Lead Agencies and all affected jurisdictions 30 days prior to construction.

## 4.12.5 Residual Impacts after Mitigation Measures were Implemented

There would be a loss of 1,746 acres of recreation opportunities and experiences within the site boundary.

## 4.12.6 Unavoidable Adverse Impacts

The surface disturbance that would occur from the GSEP would result in unavoidable adverse impacts on recreation resources by permanent removal of vegetation, landforms, and other nature features of the characteristic landscape for the life of the GSEP or until decommissioning and restoration occurs.

# 4.13 Social and Economic Impacts

## 4.13.1 Impact Assessment Methodology

The social and economic analyses of the proposed action effects complies with the National Environmental Policy Act (NEPA) requirements given the respective power plant licensing and land jurisdictions within the BLM. The social and economic impact analyses evaluate project-related changes on the existing local population and economy (including employment and the relationship to local housing conditions). The economic impacts of the GSEP-related construction and operation spending of the GSEP and other related socioeconomic impacts are also estimated. The proposed action's projected peak employment is used to analyze worst-case construction employment impacts to the local communities, their social character and their economies. The potential effects to the local area's social character are evaluated based on the findings of the economic impact analysis.

The impacts on public services related to health and safety (e.g. police protection, fire protection and emergency medical services) are analyzed in Section 4.11, Impacts on Public Health and Safety. Potential effects on parks and recreational opportunities are considered in Section 4.12, Impacts on Recreation.

The Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR Part 1500 - 1508) provides no specific thresholds of significance for socioeconomics impact assessments. Significance varies, depending on the setting of the proposed action (40 CFR 1508.27[a]), but 40 CFR 1508.8 states that indirect effects may include those that are growth-inducing and others related to induced changes in the pattern of land use, population density, or growth rate.

An input-output model (IMPLAN) was used to estimate the indirect economic impacts associated with construction- and operation-phase expenditures resulting from the GSEP that would benefit the eastern Riverside County region.

The cumulative impact analysis evaluated the socioeconomic impacts of the future combined implementation of the Solar Project identified in the Cumulative Project Scenario discussed in Section 4.1.

## 4.13.2 Discussion of Direct and Indirect Impacts

### Proposed Action

#### *Construction*

Construction employment and spending for the proposed action would be the primary direct economic impact associated with the GSEP. As such, the construction employment and related spending effects would be a temporary impact lasting for the anticipated 37-month duration of the construction period. Given the absence of any significant current economic use of the site, the

construction activities associated with the proposed action would represent a beneficial economic impact adding new employment and spending to the local economy.

### Economic

As discussed in greater detail in Section 3.14, Social and Economic Setting, the origin of GSEP construction workers is a central factor determining the magnitude and extent of potential socioeconomic impacts to the local economy and communities associated with the proposed action. The direct benefits of employment and higher personal incomes primarily would benefit the communities from which construction workers and their families reside, since construction workers would likely spend the majority of their earnings in these communities. The workers' spending for goods and services would have an indirect socioeconomic impact on the communities and economies where that spending occurs. In addition, if there is an insufficiency of suitable local workers to staff the GSEP, then the GSEP could attract individuals to relocate to the area (either temporarily or permanently), which could consequently result in an increased demand for housing and local services. If there is insufficient housing or service capacity, then adverse indirect social and economic impacts could result. People permanently (or in some cases even only temporarily) moving into the area for work could encourage the construction of new homes, extension of roads and/or other infrastructure development and/or could increase the existing demand for public services. Informal worker lodging or camping in the local area would likely be a particular concern. Given the relatively long commute distances that some workers could face, some could seek to save travel-related time and costs by choosing to camp at existing public camp sites or, informally, on nearby public or private lands.

### Project Construction Labor Needs

The availability of the local and regional workforce to meet the GSEP's construction labor needs has been analyzed to determine whether the GSEP would induce population growth. Consistent with the geographic demarcations for the local and regional study areas, the "local workforce" consists of employable residents living in relatively close proximity to the site (i.e., the cities of Blythe, California or Quartzite, Arizona; or the community of Ehrenburg, Arizona).[1] The "regional workforce" consists of all potential employable adults currently living up to a two-hour commute (one-way) to the site. As discussed in Section 3.14 and shown in Figure 3.14-1, the regional labor force consists of the employable adults living in the cities west of the site along I-10 as far as, and including, the City of Banning.

The Applicant expects that construction would last 37 months, with an average of about 646 daily construction workers with a peak employment of 1,085 workers during month 16 of construction (GSEP 2009a, p. 5.11-14). Generally, increased employment represents a beneficial economic impact on local communities from the new job opportunities and increased income generated for the local economy. However, in rural areas such as Blythe and/or projects with more skilled/specialized job requirements, increased labor demand can have adverse indirect

[1] In addition, residents living in the unincorporated areas near these communities or within an hour's commute of the project would also be considered local labor force. However, given the very limited data on the unincorporated residents, it is conservatively assumed that all the unincorporated population identified in Section 3.14 are regional but not local residents.

socioeconomic impacts on the local communities if it causes significant in-migration that the existing local housing, infrastructure and/or other public services cannot support. The estimated peak employment of 1,085 is used to analyze worst-case construction employment related impacts from potential in-migration.

### Labor Force Supply

Table 4.13-1 shows Year 2006-2016 occupational employment projections for the Riverside/ San Bernardino/Ontario MSA[2] by construction labor skill as compared to the estimated number of total construction workers by craft needed during the peak month (month 23) as presented in the Application for Construction (AFC) (Solar Millennium 2009a, p 5.11-26). The primary trades required for construction of the proposed action will include pipefitters, skilled and unskilled laborers, electricians, carpenters, equipment operators, ironworkers, and truck drivers.

**TABLE 4.13-1**
**TOTAL LABOR BY SKILL IN RIVERSIDE/SAN BERNARDINO/ONTARIO MSA (2006 and 2016 Estimate) AND PROJECT REQUIRED CONSTRUCTION BY CRAFT PEAK MONTH**

| Trade | Total # of Workers for Project Construction by Craft – Peak Month | Riverside/ San Bernardino/Ontario MSA 2006 | Riverside/ San Bernardino/Ontario MSA 2016 |
|---|---|---|---|
| Operator | 60 | 4,790 | 5,460 |
| Insulators | 24 | 27,930[a] | 32,080[a] |
| Laborer | 96 | | |
| Teamster | 38 | | |
| Painter | 15 | | |
| Solar Field Craft | 305 | | |
| Carpenter | 44 | 28,850 | 32,390 |
| Pipe Fitter | 200 | 4,630[b] | 5,330[b] |
| Electrician | 105 | 6,740 | 7,600 |
| Cement Finisher | 4 | 4,110 | 4,690 |
| Ironworker | 70 | 19,460 | 20,800 |
| Millwright | 22 | 2,630[c] | 2,960[c] |
| Construction Staff | 102 | 10,990[d] | 12,380[d] |
| ***Total*** | ***1,085*** | ***111,550*** | ***125,360*** |

NOTES:
[a] "Construction Laborers" category was used.
[b] "Plumbers, Pipefitters, and Steamfitters" category was used.
[c] "Machinists" category was used.
[d] "Supervisors, Construction and Extraction Workers" category was used.
[e] "Helpers - Construction Trades" category was used.

Source: Solar Millennium 2009a, Tables 5.11-8, 5.11-11, and 5.11-17.

[2] Metropolitan Statistical Areas (MSA) are geographic entities defined by the U.S. Office of Management and Budget (OMB) for use by Federal and State statistical agencies in collecting, tabulating, and publishing socioeconomic statistics. The Riverside/San Bernardino/Ontario MSA consists of Riverside and San Bernardino Counties combined. As such, the MSA population and labor force estimates include a major portion of individuals residing outside the likely daily commuting range from the site.

Table 4.13-1 shows that there is a very large population of suitably skilled construction workforce for the proposed action currently living within Riverside and San Bernardino Counties.[3] However, only a portion of these workers could be expected to be currently living within the region. Based on the regional study area's estimated 2010 population of 559,193 residents, compared to a corresponding Riverside and San Bernardino population of 4,212,684, the regional study area's skilled labor force would total approximately 13.3 percent of the skilled workforce shown in Table 4.13-1. Overall, that would suggest a total skilled labor force of approximately 15,755 workers (13.3 percent of approximately 118,455 total skilled construction workers)[4] living within the regional study area.

Applying the current local unemployment levels of 12.7 percent within the regional study area would suggest that approximately 2,000 unemployed skilled workers may currently reside in the regional study area. Compared with the required average project employment need of 646 workers, the proposed action could employ up to approximately 32.3 percent of the estimated currently unemployed construction workers. During peak construction, 1,085 workers would be needed, which would employ up to nearly 54.3 percent of the estimated available unemployed skilled workforce. While this would represent a major proportion of the region's skilled workforce, there also could be individuals amongst the region's estimated nearly 30,240 unemployed (i.e. 32,240 total regional unemployed – 2,000 regional skilled unemployed construction workers) that have or could obtain the necessary training to perform the facility construction. Also, it is likely that some of the currently employed skilled local construction workers would change their jobs in order to work closer to home and their positions could be filled by other workers living outside of the regional study area.

Consequently, it is expected that most, if not all, of the construction employment for the GSEP would consist of construction workers who live within a two-hour commute from the site. Employee ride sharing, and the relatively long duration of the work would likely encourage workers to commute considerable daily distances to work on the project.

### Housing and Lodging Impacts within the Local Study Area

As shown in Table 3.14-2, the current published vacancy rates for the cities of Blythe, California; Ehrenberg, Arizona; and Quartzsite, Arizona are 16.1, 34.9, and 41.9 percent, respectively. These vacancy rates indicate that some currently vacant housing could be available for construction workers who choose to relocate within the local study area. Altogether, it is conservatively estimated that up to approximately 2,480 existing housing units could be available as potential housing for future construction workers (this estimate does not account for other potential available housing within the unincorporated local study area). The extent to which construction workers choose to rent local housing would depend on the rental prices and the condition of the available housing. Especially if construction workers would be willing to share rental

[3] Given its more rural character and the far smaller size of its labor force, only a very minor proportion of future construction workers would be expected to originate from La Paz County in Arizona. For this analysis, it is conservatively assumed that all construction workers for the GSEP would be California residents.

[4] Using the average of 2006 and 2016 skilled labor force estimates shown the Table 3.14-1.

**TABLE 4.13-2**
**GSEP CONSTRUCTION ECONOMIC BENEFITS (2010 Dollars)**

| | |
|---|---|
| **Fiscal Benefits** | |
| State and local sales taxes | $4.0 million ($1.3 million average per year) |
| **GSEP Construction Spending** | |
| Labor | $165.0 million ($53.5 million average per year) |
| Materials, equipment and services | $14.5 million ($4.7 million average per year) |
| Total | $179.5 million ($58.2 million average per year) |
| **Direct, Indirect, and Induced Benefits** | |
| Direct | |
| Economic Output | $179.5 million ($58.2 million average per year) |
| Jobs | 646 jobs (monthly average) |
| Indirect | |
| Economic Output | $37.2 million ($12.1 million average per year) |
| Jobs | 89 jobs |
| Induced | |
| Economic Output | $99.6 million ($32.3 million average per year) |
| Jobs | 269 jobs |
| Total | |
| Economic Output | $316.3 million ($102.6 million average per year) |
| Jobs | 1,004 jobs |

SOURCE: Solar Millennium, 2009a; ESA, 2010.

accommodations, rental housing could be an option for workers wishing to relocate or, more likely, commute weekly to work at the site.

In addition, as discussed in Section 3.14, analysis of the current motel and hotel businesses and their occupancy rates suggests that lodging could be available to accommodate construction workers who choose to stay temporarily at a local motel or hotel to be close to the site. There are approximately 1,000 hotel/motel rooms within the local study area (i.e., the Cities of Blythe and Quartzite and community of Ehrenburg) (GSEP 2009a, p. 5.11-27).

Other lodging opportunities also could be available at privately-owned RV/campgrounds and public campground areas within the local study area. However, during the high season (December to March) these facilities can be popular with visitors and, therefore, could have only limited availability for construction workers. In addition, most of the public campgrounds (including the BLM administered Long Tern Visitor Areas) are intended for recreational use; construction workers might not be permitted to use these areas. Consequently, it is unlikely that the public RV/campgrounds would be very suitable or attractive lodging options for most GSEP construction workers who seek local accommodations.[5] However, BLM may allow temporary

5 Except for construction workers that already own their own RV or camper trailers.

LTVAs to be established on site for construction workers for the duration of project construction as temporary lodging facilities.

Furthermore, particularly during the non-winter season, it is likely that there would be considerable housing opportunities within the local area for construction workers seeking temporary accommodations. Lodging facilities within the local study area could include both rental housing for workers seeking longer term local housing and motel lodging for those looking for more occasional or shorter stay accommodations. The relatively high vacancy rates also would ensure that any GSEP-related temporary housing needs would be met with existing housing or lodging facilities. As a result, no new housing or motel development would be expected to be induced by the proposed action and the increased use of these under-utilized housing or motel lodging would be considered beneficial for local property owners.

### Construction Worker Expected Commuting Patterns

Given the major skilled labor force residing within the areas of Riverside and San Bernardino Counties, and the common construction worker commuting habits (ESRI, 1982; CEC, 2010), it is reasonable to expect that GSEP construction workers residing outside the regional study area would commute weekly to the local area rather than in-migrate with their families. Consequently, any such workers who choose to reside temporarily in the local area would have a limited service impact on local public services and infrastructure. Furthermore, given that existing housing and/or lodging facilities would be used to accommodate the few (if any) construction workers who choose to stay temporarily in the local area, the local transient occupancy tax revenues, local rental home owners' property, and/or business taxes payments should account for their limited local infrastructure and public service usage.

Therefore, it is concluded that the proposed action would not induce substantial growth or concentration of population in either the regional or local study areas. Furthermore, construction of the proposed action would not encourage people to relocate to the area and, thereby, would not result in new and unplanned growth or land use changes.

### Construction Spending Impacts

Construction of the proposed action would create a temporary, positive impact on the local economic base and fiscal resources. Construction workers wages and salaries would provide additional income to the area, as would expenditures within the local and regional study areas for construction materials and services. An IMPLAN input-output model was used to estimate economic impacts within eastern Riverside County based on the construction-phase GSEP-related expenditures that would be expected to occur within the regional study area.

IMPLAN is an economic impact modeling tool that uses region-specific input/output accounts by industry to estimate secondary impacts of economic changes. Secondary impacts include: (1) indirect impacts that occur due to the purchase of goods and services by firms involved with construction and operation; and (2) induced impacts, which result from household spending by project- related employees. Secondary impacts can occur in the form of employment, income, output, and taxes.

Social Accounting Matrices (SAM) multipliers were used for the impact analysis. SAM multipliers are recommended by the writers of the IMPLAN software because an induced effect estimate using a SAM multiplier is based on information in the social account matrix, which accounts for social security and income tax leakage, institution savings, and commuting. The multipliers for the impact analyses for the proposed action were derived based on specific industry data for the Riverside County study area in the IMPLAN Professional input/output relationships to represent the direct economic impacts associated with the proposed action (e.g., estimated annual construction cost and annual operation cost). Zip code level IMPLAN data was obtained to enable both Riverside County and sub-County area analysis of the spending impacts from future project construction and operation. IMPLAN Sector 36, "Construction of other new non-residential structures," was selected as the IMPLAN sector most closely corresponding to the North American Industry Classification System Code 21, which is used for "Power plants, new construction." All figures are in presented in 2010 dollars. Table 4.13-2 summarizes the IMPLAN analysis findings.

The proposed construction labor payroll has been estimated at approximately a total of $165 million over 37 months ($53.5 million estimated annually). Capital expenditures and local spending on construction materials, equipment, and service are estimated to total approximately $14.5 million over 37 months ($4.7 million estimated annually). For this analysis, it was assumed that the construction material and equipment purchases would include standard construction materials and services that would mostly be obtained from within the IMPLAN study area.[6] These GSEP expenditures were used to estimate the economic benefits to the local and regional economies. The IMPLAN model also assumes that all of the construction workers for the proposed action would be from within the regional study area of eastern Riverside County.

The proposed solar facility construction is expected to directly create an average of 646 annual full-time employees over 37 months, with a peak monthly employment of 1,085 full-time employees. This new employment would create both indirect and induced secondary employment in the regional study area. Indirect employment is defined as employment that would be generated by the purchase of goods and services required for the facility's development. Induced employment is defined as employment that would be generated by the purchase of goods and services by businesses that are indirectly supported by the proposed action.

As shown in Table 4.13-2, according to the IMPLAN analysis, construction of the GSEP could be expected to have the direct beneficial economic impact of generating an average of $58.2 million in annual spending on construction labor within the regional study area for the duration of the construction period. In addition, an average of approximately $12.1 million would be spent annually on construction materials, equipment, and services from businesses within the regional study area. Together, the construction spending is expected to generate up to an additional $44.4 million per year in indirect and induced economic output for other businesses in eastern Riverside County.

6 The costs for specialized solar materials and equipment (e.g., panels) that would have to be purchased from outside Riverside County are not included, since their acquisition from out-of-County or out-of-State suppliers/manufacturers would have minimal economic benefit to local or regional businesses.

The actual future economic impact for eastern Riverside County could be smaller than the total economic benefits shown in Table 4.13-2. GSEP-related spending would benefit eastern Riverside County and the local economies depending on the extent that workers live and spend their earnings at businesses locally and elsewhere in eastern Riverside County. Given the local study area's rural character, most of the projected benefits would likely be received by the larger cities and communities located elsewhere in eastern Riverside County, outside the local study area. The economic benefits to both local and regional businesses could be less than those estimated by the IMPLAN model if greater sales leakage occurs assumed for by the IMPLAN model. Irrespectively, the net short-term economic impact on the local and regional economies would be considerable.

In terms of economic output impacts, the primary local industries that would benefit the most include the following: rental housing, architectural and engineering services, wholesale and retail trade businesses, real estate establishments, physicians and other medical professionals, food service, and hotel/motel businesses.

## Social

The potential for GSEP-related impacts to the local study area's social character are determined by the nature of economic impacts of the construction activity and any GSEP-related in-migration.

As discussed above, construction of the GSEP could be expected to generate considerable economic benefits directly for both construction workers and local businesses providing materials and services for construction. In addition, major indirect and induced spending benefits for the local and eastern Riverside County economies would be generated by subsequent spending of the construction workers and construction businesses' income within the local and regional economy. The economic benefits are expected to extend widely within the local and regional economy but would most benefit food, retail, lodging, real estate, and medical related businesses.

The additional new income for the local economy from the GSEP would have a positive, but short-term, contribution towards supporting local business and maintaining the economic vitality of the City of Blythe and other neighboring communities. The positive effect for the local economy would be increased given the local study area's recent and on-going economic weaknesses as a result of both longer term changes and the more recent economic downturn. The continued viability of Blythe's local business community is essential for its long term well-being. Increased local employment opportunities would improve local residents' standard of living and will help retain younger residents who otherwise would be more likely to leave the community if there are insufficient local employment opportunities. The local community's positive social attitudes to the proposed action may generally be expected to increase based on the extent that local residents are employed (either directly or indirectly) or otherwise benefit from the GSEP.

GSEP-related in-migration of new residents could affect the social character of the local study area. An influx of new individuals with different values, lifestyles, and/or socio-demographic backgrounds could have a positive or negative influence on the quality life and/or community

values. The existing community members' attitudes and opinions to any such changes could vary greatly among individuals. However, in general, the magnitude of the in-migration would need to be relatively substantial for the social environment to be noticeably altered. Furthermore, social changes typically require, or are most commonly associated with, permanent changes to the community's composition and/or attitudes rather than as the result of short-term influences or changes.

As discussed above, the majority of construction workers for the GSEP would be expected to commute daily to the site. Given that most workers would likely travel to the site from their homes located west of Blythe, local residents may have little daily interaction with most workers. It is possible that some construction workers could chose to commute weekly from their homes and stay within the local area at local hotels/motels or perhaps rent homes. In this case, after the workday is over, these individuals would be more likely to interact with existing residents at local businesses or community facilities. However, given the very limited number of construction workers expected to stay in the local area during the work week, the presence of these individuals would not be expected to result in substantial or long-term adverse effects to the local area's social composition and character.

Therefore, in general, given the expected new local employment opportunities and economic benefits to local business and relatively limited temporary in-migration of construction workers, most local residents and stakeholder groups would be expected to be supportive or, at a minimum, would not oppose the solar facility's construction. Consequently, the GSEP would be expected to have a minor and largely positive impact on the social character of the local study area for the temporary duration of facility construction.

## Alternatives

### *Reduced Acreage Alternative*

Construction spending and employment for the Reduced Acreage Alternative would be expected to be lower than for the proposed action and, consequently, the social and economic impacts would be similarly reduced in magnitude.

### *No Action Alternative A*

The social and economic impacts associated with the proposed action would likely only be delayed by selecting No Action Alternative A, since this region of the United States has extremely positive characteristics for solar power generation. If the proposed action were not approved, another application for a different solar generating facility or a different type of solar generating facility would likely be filed at some time in the future. An application could also be filed for a wind energy facility or any other kind of use and impacts would result based on the specific use requested.

### *No Project Alternative B*

The social and economic impacts resulting from the proposed action would not occur under No Project Alternative B since the application would be denied and the subsequently amended plan would identify the land as unsuitable for solar energy generation. However, the land would remain open to other types of rights-of-way and/or land use authorizations, resulting in potential impacts specific to a future use other than solar energy generation.

### *No Project Alternative C*

Impacts associated with the proposed action would likely only be delayed under No Project Alternative C, since this region of the United States has extremely positive characteristics for solar power generation. If this proposed action were not approved, another application for a different solar generating facility would likely be filed at some time in the future.

## Operation

### *Economic*

As discussed in greater detail in Section 3.14, the origin of GSEP workers is a central factor determining the magnitude and extent of potential socioeconomic impacts to the local economy and communities from the proposed action. The direct benefits of employment and higher personal incomes primarily would benefit the communities where the workers and their families reside, since that would likely be where they spend the majority of their earnings. Workers' spending for goods and services would have an indirect on the communities and economies where that spending occurs. In addition, if there are an insufficient number of suitable local workers available to staff the GSEP, then the GSEP could attract individuals to relocate to the area, which, in turn, could result in an increased demand for housing and local services. If there is insufficient housing or service capacity to meet the new demand, then adverse indirect social and economic impacts could result.

For this analysis, the GSEP would "induce substantial population growth" if workers permanently (or in some cases even only temporarily) move into the local area for employment at GSEP facilities and, thereby, encourage the construction of new homes, extension of roads, other infrastructure development, and/or increase demand for public services.

#### Project Operations Labor Needs

The employment and spending by the proposed action's future operations would be the primary direct long-term economic impact associated with the GSEP. The proposed action is expected to require a total of up to 65 permanent full-time employees (GSEP 2009, p. 5.8-23). Table 4.13-3 shows Year 2006-2016 occupational employment projections for the Riverside/ San Bernardino/Ontario MSA by operational labor skill as compared to the estimated number of total operational workers needed.

**TABLE 4.13-3**
**TOTAL LABOR BY SKILL IN RIVERSIDE/SAN BERNARDINO/ONTARIO MSA (2006 and 2016 Estimate) AND PROJECT REQUIRED OPERATION**

| Trade | Total # of Workers for Project Operation | Riverside/ San Bernardino/Ontario MSA 2006 | Riverside/ San Bernardino/Ontario MSA 2016 |
|---|---|---|---|
| Maintenance and Repair Workers, General | -- | 11,920 | 13,690 |
| Plant and System Operators | -- | 2,030 | 2,380 |
| ***Total*** | ***65*** | ***13,950*** | ***16,070*** |

SOURCE: GSEP,2009; EDD, 2010.

Approximately a third of the operations jobs would be lower skilled positions. All employees would be provided with necessary training. The basic job requirements for the lower skilled operations workers would likely be high school diplomas and basic mechanical equipment operating abilities. Former agricultural equipment operators, construction laborer, and many other manual labor jobs would be expected to have transferrable skills.

The other more skilled operations would generally require some secondary education and greater mechanical/electrical equipment experience than the lower skilled operation position. Project construction workers and more experienced farm or other equipment operators would be expected to have transferrable skills suitable to those required for these positions. On-the-job training could be expected to enable, over time, some lower skilled employees to gain the expertise necessary to staff the more skilled operations positions. In addition, local community colleges (Palo Verde College in Riverside and College of the Desert in Palm Desert) as well as University of California - Riverside have recently developed Utility Job Training Courses with federal funding support specifically designed to provide its students with the training necessary to qualify for the higher skilled operations jobs.

As shown in Table 4.13-3, data for the Riverside/San Bernardino/Ontario Metropolitan Statistical Area (MSA) indicates that in the 2006, the “Maintenance and Repair Workers, General” and “Plant and System Operators” employment sector contained a total of 13,950 workers, with 2016 forecasts for these employment sectors to grow to a total of 16,070 employees. The existing labor force of currently qualified plant and system operators within Riverside and San Bernardino counties is relatively limited and likely reflects the current level of available employment opportunities. As discussed in the previous estimate of the proportion of construction work living in the regional study area, on a per capita basis, it may reasonably be assumed that approximately 13.3 percent of these Riverside MSA operators and general maintenance workers would live within the regional study area. These would correspond to approximately 2,135 maintenance workers and plant operators,[7] of which, based on the regional unemployment levels, approximately 263 would be expected to be currently unemployed.

[7] Using the average of 2006 and 2016 skilled labor force estimates shown the Table 4.13-3.

While the demand for 44 more skilled plant operators for the facility's future operations would likely exceed the region's existing supply of unemployed plant operators, the demand would also correspond to less than a fifth of the estimated unemployed general maintenance workers in the region. In addition, there would also be individuals amongst the region's estimated other nearly 24,077 unemployed (i.e. 24,340 total regional unemployed – 263 unemployed general maintenance / plant operators) that have or could obtain the necessary training to perform the facility operations. Also, it is likely that some of the currently employed workers would change their jobs to obtain a better paying job and/or to work closer to home. Given the region's high unemployment levels, any currently employed worker switching jobs could expect to have their vacated position filled by other workers (possibly including others living outside of the regional study area).

According to the Applicant, at least 50 percent of workers would be expected to come from within the regional study area workforce (GSEP, p. 5.8-23), resulting in a potential influx of up to 33 workers in communities within the proposed action's regional and local study areas (Solar Millennium 2009a). Consequently, it is expected that most of the facility's operations employment would be provided by workers living within the regional study area from the site. Future GSEP-related in-migration may occur but would be expected to be very minor with at most 55 employees relocating to the local study area. Furthermore, depending on the success of local training programs and possible interest amongst project construction workers or other more skilled local residents, actual in-migration may be lower or unnecessary except for a few top plant management and supervisory positions.

### Housing Impacts within the Local Study Area

There would be greater incentive for future operations workers to live closer to the site since the operations job opportunities at the solar facility would be permanent positions. These operations jobs also could encourage workers to seek permanent homes in the local area. As shown previously in Table 4.13-2, the most current published vacancy rates for the cities of Blythe, California; Ehrenberg, Arizona; and Quartzsite, Arizona are 16.1, 34.9, and 41.9 percent, respectively. These vacancy rates indicate that there is likely currently considerable vacant housing, which could be available to future operations workers who choose to relocate to the local study area. Altogether, it is conservatively estimated that up to approximately 2,480 existing housing units could be available as potential housing for future construction workers (the estimate does not account for other potential available housing within the unincorporated local study area).

Currently, home and rental prices within the City of Blythe and the other communities within the local area are relatively affordable and there is considerable available housing supply. These vacancy rates and the relatively minor number of GSEP employees likely seeking local housing indicates that more than sufficient existing local housing would be available for any future operational employees choosing to relocate to the local area. Therefore, no new housing or infrastructure growth would be necessary to provide housing or public services for the GSEP's operations workforce.

Future facility operations would encourage, at most, a small number of people to relocate to the area. The small magnitude of the potential action-related in-migration would be readily accommodated by the local area's existing housing and, consequently, would not result in new and unplanned growth or land use changes. Therefore, it is concluded that the proposed action would not induce substantial growth or concentration of population in the local study areas.

Consequently, the GSEP's future operations would not be expected to result in population growth either directly or indirectly that would be major in magnitude or adverse in nature.

### Operations Spending Impacts

The future facility operations would have a long-term, positive impact on the local economic base and fiscal resources. Operations workers' wages and salaries would provide additional income to the area, as would expenditures within eastern Riverside County for construction materials and services.

As discussed in the construction spending impact analysis, an IMPLAN input-output model was used to estimate the indirect and induced economic impacts for eastern Riverside County based on the operation-phase GSEP expenditures that would be expected to occur within the regional study area.

The same IMPLAN model was used to estimate the GSEP's operations impact on the eastern Riverside County economy although IMPLAN Sector 31, "Electric power generation, transmission, and distribution," was used to estimate spending impacts for operations labor since it most closely corresponds to the North American Industry Classification System Code 221119, which is used for, "Electric power generation: solar." For this analysis, it was assumed that the operations material and equipment purchases would be for standard construction materials and services that would mostly be obtained from within the IMPLAN study area. These GSEP expenditures were used to estimate the economic benefits to the regional study area economy. The IMPLAN model also assumes that all of the GSEP's operations workers would reside within the regional study area of eastern Riverside County.

GSEP operations would create a permanent, positive impact on the local economy and fiscal resources. Operations employees' salaries would provide additional income to the area, as would expenditures within the multi-county study area for operations and maintenance materials and services. Table 4.13-4 summarizes the IMPLAN analysis findings for the future GSEP operations.

The annual expenditures of the GSEP were assumed to be $0.5 million for materials, equipment, and supplies; and $6.0 million in payroll annually. These figures were used as inputs into the model to predict economic and employment impacts.

GSEP operations are expected to directly employ 65 full-time employees. This employment would create both indirect and induced secondary employment in the region. Indirect employment is defined as employment that would be generated by the purchase of goods and services required by

**TABLE 4.13-4**
**GSEP OPERATIONS ANNUAL ECONOMIC BENEFITS (2010 Dollars)**

| | |
|---|---|
| **Fiscal Benefits** | |
| Estimated annual property taxes | $628,000[1] |
| State and local sales taxes | $430,000 |
| School Impact Fee | $18,330 |
| **Project Operations Spending** | |
| Labor | $6.0 million |
| Operations and maintenance supplies | $0.5 million |
| Total | $6.5 million |
| **Direct, Indirect, and Induced Benefits** | |
| Direct | |
| Economic Output | $6.5 million |
| Jobs | 65 jobs |
| Indirect | |
| Economic Output | $0.4 million |
| Jobs | 3 jobs |
| Induced | |
| Economic Output | $3.5 million |
| Jobs | 29 jobs |
| Total | |
| Economic Output | $10.4 million |
| Jobs | 97 jobs |

NOTES:

[a] At present, there is no property tax assessed on solar components (mirrors, solar boiler, heat exchangers) improvements by law (Section 73 of the California Taxation and Revenue Code). Components included under the exemption include storage devices, power conditioning equipment, transfer equipment, and parts. The first operational year would generate an estimated $400,000 in annual property taxes.

SOURCE: GSEP, 2009; ESA, 2010.

the GSEP. Induced employment is defined as employment that would be generated by the purchase of goods and services by businesses that are indirectly supported by the GSEP.

As shown in Table 4.13-4, according to the IMPLAN analysis, GSEP operations could have the direct beneficial economic impact of generating a total of $6.5 million in annual spending on labor and materials within eastern Riverside County. This operations spending would be also expected to generate up to $3.9 million in new indirect and induced economic output and earnings for other businesses and residents within eastern Riverside County.

The actual future economic impact for eastern Riverside County could be smaller than the total economic benefits shown in Table 4.13-2. GSEP related spending would benefit eastern Riverside County and the local economies depending on the extent that workers live and spend their earnings at businesses locally and elsewhere in eastern Riverside County. Given the local study area's rural character most of the projected benefits likely would be received by the larger cities

and communities located elsewhere in eastern Riverside County outside the local study area. The economic benefits to both local and regional businesses could be less than estimated if greater sales leakage occurs than that expected by the IMPLAN model. Irrespectively, the net annual economic impact would be a minor and positive benefit on the local and eastern Riverside County economies.

In terms of economic output impacts, the primary local industries that would benefit the most include: rental housing, architectural and engineering services, wholesale and retail trade businesses, real estate establishments, physicians and other medical professionals, and food service businesses.

## Social

The potential for proposed action-related impacts to the local study area's social character are determined by the nature of economic impacts of the GSEP and any related in-migration.

As discussed above, the GSEP could generate considerable economic benefits directly for both workers and local businesses providing materials and services for the project. In addition, major indirect and induced spending benefits for the local and eastern Riverside County economies would be generated by subsequent spending by the workers and businesses income within the local and regional economy. The economic benefits are expected to extend widely within the local and regional economy but would most benefit food, retail, lodging, real estate, and medical-related businesses.

The additional new income for the local economy from the GSEP would have a positive contribution towards supporting local business and maintaining the economic vitality of the City of Blythe and the other neighboring communities for the lifetime of the project. The positive effect for the local economy would be increased given the local study area's recent and on-going economic weaknesses as a result of both longer term changes and the more recent economic downturn. The continued viability of Blythe's local business community is important for the City's long-term well-being. Increased local employment opportunities would improve local residents' standard of living and would help retain younger residents that otherwise would be more likely to leave the community if there are insufficient local employment opportunities. The extent of the local community's positive social attitudes towards the GSEP could be expected to increase as more local residents gain employment (either directly or indirectly) or otherwise benefit from the GSEP.

Project-related in-migration could affect the social character of the local study area. An influx of new individuals with different values, lifestyles and/or socio-demographic backgrounds could have a positive or negative influence on the quality life and/or community values. The existing community members' attitudes and opinions to any such changes could vary greatly between individuals. However, generally, the magnitude of the in-migration would need to be relatively substantial to noticeably alter the prevailing social environment. Furthermore, social changes typically require or are most commonly associated with permanent changes to the community's composition and/or attitudes rather than as the result of short-term influences or changes.

The majority of the facility's permanent workforce is expected to commute daily to the site. Given that most workers would likely travel to the site from their homes located west of Blythe, local residents would have little daily interaction with most workers. It is possible that some workers would choose to commute weekly from their homes and stay at local hotels/motels or perhaps rental homes. In the latter case, before or after the workday is over, these individuals would be more likely to interact with existing residents at local businesses or community facilities. However, given the very limited number of workers expected to stay in the local area during the work week, their presence would not be expected to result in substantial or long-term adverse effects to the local area's social composition and character.

Therefore, generally, given the expected new local employment opportunities and economic benefits to local business and relatively limited in-migration of permanent workers, most local residents and stakeholder groups would be expected to be supportive or at a minimum not opposed to GSEP operation. Consequently, the proposed action is expected to have a minor impact and largely positive impact on the social character of the local study area's economy for the 30-40 year duration of the GSEP.

## Alternatives

### *Reduced Acreage Alternative*

The operations spending and employment for the Reduced Acreage Alternative would be expected to be reduced from that for the proposed action and, consequently, the social and economic impacts would be similarly lesser in magnitude.

### *No Action Alternative A*

The social and economic impacts associated with the proposed action would likely only be delayed by selecting No Action Alternative A, since this region of the United States has extremely positive characteristics for solar power generation. If this proposal were not approved, another application for a different solar generating facility or a different type of solar generating facility would likely be filed at some time in the future. An application could also be filed for a wind energy facility or any other kind of use and impacts would result based on the specific use requested.

### *No Project Alternative B*

The social and economic impacts resulting from the proposed action would not occur under No Project Alternative B, since the application would be denied and the amended plan would classify the land as unsuitable for solar energy generation. However, the land would remain open to other types of rights-of-way and/or land use authorizations, resulting in potential impacts specific to a future use other than solar energy generation.

### *No Project Alternative C*

Impacts associated with the proposed action would likely only be delayed by selecting No Project Alternative C, since this region of the United States has extremely positive characteristics for

solar power generation. If this proposed action were not approved, another application for a different solar generating facility would likely be filed at some time in the future.

## Decommission

### *Economic*

The anticipated lifespan of the GSEP is estimated to be 30 to 40 years. Closure- and decommissioning-related social and economic impacts would be related to both the discontinuation of the solar operations and the short-term effects of the necessary facility deconstruction and subsequent site reclamation activities.

The direct economic impact associated with discontinuation of the solar energy generation site would result in job losses for the operations workforce, which would no longer be needed to maintain the facility's daily operations and/or repair the solar power generation equipment and related infrastructure. Closure would also directly reduce future revenues to any local material, equipment, and service suppliers previously supporting the facility's daily operations.

In addition, closure would have the additional adverse economic effect of reducing the employment and revenues for other local or regional businesses that rely on spending by the GSEP's operations staff or suppliers. As a result of the reduced income and revenues of these affected businesses, the GSEP's staff and support businesses would make few purchases from other local businesses, which, in turn, would reduce these businesses and its employees' income and purchasing ability.

Deconstruction activity could, however, result in a short-term increase in local spending from the employment, equipment, and materials required to both dismantle the solar facility and reclaim the site. The cost and duration for the deconstruction activities is likely to be roughly comparable to that of the construction; except that the amount of labor and materials would be less than that required for the facility development because the facility would not need to be operational. The magnitude and duration of the resulting short-term economic benefits would likely be proportional to the extent of the deconstruction activity required for the facility's removal. The economic benefits to the local and regional economy would also likely be of a similar type and magnitude as those projected for construction, unless there is significant change to the local and regional economy during the interim period.

Given a reasonable expectation of considerable increased solar-related local business development and employment, it could be expected that there would be an increased number and variety of businesses that could provide necessary solar-related services. This would, in turn, ensure that the local and regional economies would be able to retain a greater proportion of benefit from the future decommissioning spending since a smaller proportion of the work would be performed by out-of-region businesses and, hence, leak out the region's economy.

Consequently, the economic impacts associated with the ultimate decommissioning could be initially positive from the increased employment and business spending over the relatively brief duration of the deconstruction and site restoration activities. However, following the completion

of the decommissioning process, there would be minor adverse long-term economic impacts to the local economy from the lost of the solar facility's employment and annual spending.

### *Social*

As discussed in the economic analysis above, ultimate closure and decommissioning would result in the reduced local employment opportunities and decreased revenues for businesses supplying the materials, equipment, and services required to operate and maintain the GSEP. In addition, there would be secondary economic losses for local residents and businesses that benefit from sales and employment by the GSEP employees and supplier businesses.

The potential for adverse social impacts would depend on the magnitude of the facility-related economic losses. Future decommissioning the proposed action alone would be expected to have, at most, a very minor adverse social impact. Given a reasonable expectation that a considerable number of other solar developments would occur within the region as well as an increase in other solar-related local business development and employment, the loss of an individual project would have a reduced potential to result in adverse social impacts. For substantial adverse social impacts to occur, the scale of employment and/or business economic losses would need to be of a type and magnitude that worker relocation and/or business closures would occur so that the local quality of life is reduced or the local communities' social character is adversely altered. Furthermore, the potential for adverse social impacts could be significantly reduced or eliminated if proposed decommissioning is anticipated and planned appropriately. In addition, the potential for adverse social impacts would also be significantly reduced if alternative employment and business opportunities develop, thereby reducing the economic impacts to the workers and businesses affected by the closure.

Consequently, future decommissioning of the GSEP could result at most in a very minor adverse long-term social impact from the reduced local employment and spending. It is also very possible that future decommissioning of the GSEP would result in a negligible adverse future social impact.

## 4.13.3 Discussion of Cumulative Impacts

The potential for cumulative socioeconomic impacts exists where there are multiple projects proposed in an area that have overlapping construction schedules and/or project operations that could impact similar resources. Projects with overlapping construction schedules and/or operations could collectively result in a demand for labor that cannot be met by the region's labor pool, which could lead to an influx of non-local workers and possibly their dependents. This population increase could impact social and economic resources if there are insufficient housing resources and/or infrastructure and public services to accommodate the new residents' needs.

Section 4.1 identifies current solar and non-solar projects which could be developed in the foreseeable future within both eastern Riverside County and elsewhere in Riverside County or the surrounding counties. While a large number of projects may be planned and, therefore, considered to be possible for future development, not all of them are expected to actually be built

due to construction funding constraints, schedule, and/or delays. Many of the currently proposed projects in the local region anticipate participation in federal funding programs and/or assistance for project development. Given the uncertain and challenging economic circumstances facing both federal and state economies, it is far from assured that future funding and other governmental support will be sufficiently available for all the proposed projects within the projected schedules.

As shown in Table 4.1-1, currently more than a dozen BLM renewable energy projects are identified in the Cumulative Project Scenario for the social and economic analysis. In addition, six smaller BLM authorized actions are also identified. Finally, the Blythe Airport Solar 1 and Chuckwalla Valley Raceway projects are two other developments expected to occur or be completed within eastern Riverside County.[8]

There are 13 solar projects proposed along the I-10 corridor predominantly between Desert Center and Blythe. Based on the currently available data for these various projects (information obtained from Plans of Development and other project documents), and assuming all projects move forward, these projects would be constructed in the same general timeframe as the proposed action (i.e. between 2011and 2016).

The cumulative analysis conservatively assumes that all the proposed solar projects would be completed (or at least begin major construction) within the five-year cumulative timeframe. This cumulative impacts discussion is based on available data with respect to both construction schedules and the projects' labor requirements. If construction and operating labor requirements are not known for some projects, average work force levels of other comparable projects and professional judgments have been used to develop conservative estimates of expected cumulative labor requirements for these projects.

## Economic

### *Construction*

#### Cumulative Construction Labor Needs

If all of the 13 major BLM Solar Projects identified in eastern Riverside County are constructed, a total of 6,108 MW of new solar power would be developed. The average solar power project would be approximately 470 MW in size and may be expected to require approximately 1,926 full time equivalents (FTE) construction workers to be built.[9] Full build-out of all 13 BLM solar projects would require approximately 25,040 FTE of construction worker employment over the cumulative analysis's five year time-frame. This labor demand would be roughly equivalent to an average of 5,000 FTE of construction workers per year annual. This level of construction worker labor demand would represent the minimum employment impact on the regional study area since

8 The Chuckwalla Valley Raceway project is scheduled for completion in late 2010 and therefore would not be expected to add any significant construction labor need during the 2011 to 2016 cumulative analysis time period.

9 This is based on an estimated average construction labor need of approximately 4.1 construction workers (FTE) per MW of solar power production capacity.

it assumes that all the BLM solar project construction work would be evenly performed over the five year period.

However, it will be solar projects' peak construction employment needs that would place the highest demand on the regional construction labor supply and have the greatest potential for cumulative socioeconomic impacts. The peak construction labor requirements for solar projects are estimated to average 1.86 workers per MW. In which case, during its period of peak construction, a typical 470 MW solar project would employ approximately 875 construction workers. Under the extremely improbable circumstance that peak construction of all 13 planned BLM solar projects happening concurrently, a maximum of 11,360 construction workers would be required in the region.

The actual cumulative construction labor force demand within the study region will be higher than the 5,000 FTE minimum and likely considerably lower than the 11,360 FTE maximum. The average construction period for BLM solar projects is estimated to be approximately 43 months or 3.6 years. Furthermore, project developers will likely seek to minimize the construction occurring during the hottest summer months and may stagger their construction periods accordingly. Consequently, some seasonality may be expected to occur as developers favor more construction during the region's cooler winter months. Therefore, conservatively assuming that all the projects would be completed with the five-year cumulative scenario period, the regional labor need for a realistic "worst case condition" would be for four projects to have peak labor needs during the same year.[10]

Given an average construction period of 3.6 years, it would be expected that at least nine of the 13 BLM solar projects would be occurring at any one time and, more likely, at least 11 would be ongoing during the expected peak labor demand period of 2012 to 2014. Therefore, the peak construction labor demand for the cumulative analysis is estimated to be equivalent to the total construction labor demand for seven solar projects under average construction conditions and four solar projects during peak construction. Altogether, such a rate of solar construction would be expected to require a total of 7,180 construction workers for the various BLM solar projects along the I-10 corridor during the years of major solar project development.[11]

In addition, there also could be demand for construction workers from the planned non-BLM solar project proposed for the Blythe Airport. This 100 MW solar project could contribute approximately 150 construction workers annually over the course of a multi-year construction period. The future construction needs of the various other non-solar projects on BLM land in the region are not known but, altogether, reasonably could be expected to have an annual construction labor need roughly comparable to another solar project (i.e., 530 construction workers).

[10] The peak construction requirement typically occurs during mid-construction, suggesting that 2012 – 2014 would be most likely to experience peak labor demands.

[11] This assumes a typical 470 MW solar projects requiring 527 workers under average construction conditions and 873 workers during their shorter periods of peak construction.

Therefore, 7,880 construction workers is very conservatively estimated to represent the maximum possible future cumulative labor force demand from the region's planned solar and non-solar development. This estimate assumes all the identified projects would be developed within the five year cumulative analysis period.[12] The proposed action's maximum potential contribution to this cumulative effect would be approximately 13.8 percent during its peak construction period. The project's average contribution to the cumulative impact would be approximately 8.2 percent during its non-peak construction.

### Regional Labor Force Supply

As discussed earlier in the social and economic analysis, the total work force of skilled construction workers currently living in eastern Riverside County is estimated to be approximately 14,665. Future demand for 7,880 construction workers would be equivalent to employment for more than half (53.7 percent) of the current skilled labor force. Such demand for construction workers far exceeds the current unemployed construction labor force. Approximately, an additional 850 skilled construction workers are currently expect to be added to the eastern Riverside County labor force by 2016 (based on past job projections shown in Table 4.13-1). The cumulative labor force demand would still represent more than half the region's currently forecasted future skilled construction labor force.

The current unemployed labor force within eastern Riverside County is estimated to be 32,240. The construction worker demand would represent approximately a 24.4 percent decrease in the regional study area's unemployment level. Although many of the region's currently unemployed residents may lack transferable skills or have the physical aptitude to acquire the necessary skills required by cumulative labor demand, many residents could be adequately trained to be employable. Furthermore, some of the construction work would be more entry-level positions which may be suitable for less skilled workers.

Some of the regional workforce currently employed in other sectors also could have the capabilities to qualify for GSEP construction work. In such cases, some job transferring may occur, especially since the construction jobs may be expected to be relatively well-paid and attractive for many local residents. The less skilled or desirable jobs vacated by individuals transferring to construction work could be filled by other less skilled unemployed residents. Finally, the cumulative labor force demand on eastern Riverside County also could be partly reduced as projects located to the west would be closer to cities and potential workers outside the GSEP's regional study area. Consequently, these projects could meet some of their labor needs from residents from San Bernardino, Riverside or Moreno Valley.

### Housing and Lodging Impacts within the Local Study Area

Nonetheless, there could be demand for specialized construction trades that exceed the available labor supply for that specialty within eastern Riverside County. In which case, it is assumed that those job positions would be filled by workers relocating into the region from elsewhere.

[12] In actuality, construction labor shortages (and related wage escalation) would also be expected to become a possible constraint reducing the pace of future development occurring.

Given the numerous factors discussed above, it is difficult to project the extent of future weekly commuting or other in-migration that would be necessary to meet the future cumulative labor needs within the region. However, as a conservative assumption, other social and economic impacts analyses for solar projects have suggested that a 15 percent rate of in-migration would be a conservative and reasonable assumption. Such a proportion of in-migration applied to the projected maximum future cumulative labor force demand would suggest that up to 1,165 construction workers could require temporary housing in the local, or possibly, regional study area.

As discussed earlier, the skilled construction labor force within Riverside County is estimated to be approximately 69,100. This suggests that there is likely to be a considerable additional potential labor force available that could be willing to commute weekly or temporarily relocate to the local area. Consequently, from a broader geographic and labor force perspective, no significant shortages of adequately skilled construction workers, if foreseen, provide adequate and/or suitable housing available for relocating near the projects' sites.

The cumulative influx in construction labor to the area could create demand for temporary housing that is greater than the existing supply of temporary lodging. As discussed in the previous construction impact analysis, private and public RV/campgrounds are not expected to be suitable or attractive lodging options for most project construction workers seeking local accommodations. There are expected to be some suitable and available temporary lodging at local hotel/motel lodging. Although, room availability and prices could be higher during the winter months, based on County-wide vacancy rate estimates, nearly 300 rooms could be available in the local area. Given that some construction workers might be willing to share rooms and save on their lodging costs, the existing local hotel/motels could be able to satisfy up to 450 future construction workers seeking local temporary housing. If construction workers are willing to commute 1 to 1.5 hours daily to the site, the supply of potential hotel/motel increases dramatically to an estimated 8,285 rooms, which would correspond to 2,420 rooms. This would be more than sufficient temporary housing for an expected 1,165 construction workers seeking temporary housing.

In addition to the available lodging in the local area, there are also potentially considerable under-utilized homes in the local area that may be suitable for rent by construction workers seeking local housing. Within the City of Blythe, approximately 880 homes are currently estimated to be vacant and another 1,594 local housing units may be available within the cities of Ehrenburg and Quartzite in Arizona. Given that some construction workers could be willing to share homes to reduce their lodging costs, these housing units could provide more sufficient housing for the projected cumulative local housing demand.

Some of the solar developers might also choose to develop onsite housing facilities for their construction work forces. For example, on-site worker accommodations are planned as part of the Rice Solar project by its developer.[13] The Eagle Crest Pumped Storage project near Desert Center

[13] Development of temporary worker housing facilities is more likely to be possible at projects (such as Rice), which are located on private property.

is located at a former mine site that has housing previously used by mine workers. Project documents indicate that the possible use of the onsite housing for the pumped storage project is under consideration. In addition, BLM may allow temporary LTVAs to be established on site for construction workers for the duration of project construction as temporary lodging facilities.

Irrespective of the availability of temporary housing, it may be expected that, even under future cumulative conditions, a relatively small proportion of construction workers would choose to permanently relocate to the local communities where they are employed during construction. This is because many construction workers could choose to commute relatively long distances to their work sites and may expect to seek work within the more populated areas of Riverside and San Bernardino Counties in the future.

Furthermore, during the same time period with the greatest potential for adverse impacts resulting from the cumulative demand for construction worker housing, there also would be a major positive economic stimulus to the Blythe area and eastern Riverside County economies associated with the solar development which could likely offset any adverse impacts.

In summary, there is potential for short-term adverse cumulative social and economic impacts in the Blythe area associated with the demand for skilled construction labor for the dozen solar projects proposed for future development within eastern Riverside County. Analysis suggests that future construction labor demand would be greatest from 2012 to 2014 and may be sufficient to exceed the existing local work force within eastern Riverside County. In which case, there may be increased demand for temporary local housing from construction workers seeking to commute weekly to the local area. However, given the estimated availability of lodging and possible rental housing, it is expected that there will adequate and suitable housing to meet any future construction worker temporary housing demand. Therefore, no major adverse social or economic impacts would be expected to result.

### *Operations*

If all of the 13 major BLM Solar Projects identified are constructed, a total of 6,108 MW of new solar power would be developed. The average solar power project is estimated to require approximately 0.21 operations workers for each MW of solar power production. Consequently, if full build-out of the planned solar development occurs, the future cumulative operations labor employment in the region would be approximately 1,280. The GSEP's operations employment of 65 jobs represents approximately a 5.2 percent contribution to the cumulative operations labor need.

As discussed in the earlier operations analysis, there is currently only a limited population of skilled plant workers living in the eastern Riverside County. However, the transferability of construction worker skills, on-the-job and local community college training opportunities, as well as the lower skilled qualification requirements for half the operations job suggest that there would be many local and eastern Riverside County residents who would be able to meet the cumulative operations labor needs.

Even conservatively assuming that up to 25 percent of the future operations labor force could be recruited from non-region residents, there would be an in-migration population of 320 operations workers. There is more than sufficient available local housing to accommodate the housing needs of these workers and their families. Furthermore, the relatively limited number of new residents would not be expected to result in any noticeably change to the local communities' social composition or character. The future operations of the solar projects will also generate significant annual economic benefits in local employment, direct and indirect spending at local businesses as well as positive sales and other tax benefits for the local area. Consequently, the cumulative social and economic effect of the future operations of the solar projects would be minor and beneficial.

### *Decommissioning*

Evaluating the proposed action's cumulative impacts when future facility decommissioning occurs is highly speculative. Ultimate decommissioning is expected to occur in 30 to 40 years' time. It is not possible to project with any confidence the likely future social and economic conditions of the local and regional study area. Similarly, it is very difficult to envision the future cumulative scenario conditions that appropriately represent the context within which the GSEP would dismantle its facilities and site reclamation would occur. Simply stated, any presumptions of the future status for the other solar projects (e.g., continued operation, replacement or decommission) would directly determine the nature of the impact that discontinuation of the proposed action would be expected to have.

In any case, the proposed action is expected to be one of many similar solar projects within the eastern Riverside County region. As such, the proposed action's contribution and influence on the region's social and economic conditions would likely be proportional to: (a) its magnitude relative to the other developments projects in the region; and (b) the collective size and relationship of the combined development projects to the region's social and economic conditions. Consequently, from the current perspective and based on the currently and foreseeable future circumstance for the project and the region, there is no evidence to suggest that future decommissioning of the GSEP would have anything but at most a very minor adverse cumulative impact on the local and regional area's economic or social environment.

## Social

### *Construction*

The cumulative impact of the many proposed future solar and non-solar development projects in Eastern Riverside County would result in considerable short-term construction activity at many locations throughout the region. Future cumulative demand for construction workers for these projects could exceed the available supply of skilled construction workers living in the region. In this case, construction workers from elsewhere in Riverside County, Southern California, or Arizona could be attracted to the area by the construction employment opportunities. The potential for adverse social impacts would be decreased if there is a sufficient suitable supply of housing and lodging to satisfy these workers' local housing demand. Therefore, in this case, no new residential or lodging growth would be expected to occur.

The ongoing construction activity in the region, influx of construction workers both commuting daily to the site, and the more limited number who could choose to temporarily live in the local area could noticeably alter the social character and environment within Blythe and the other communities within the local area. A construction worker population of 7,780 would be equivalent to nearly approximately 29 percent of the estimated total local study area population and, consequently, would be cumulatively likely to be very noticeable.

The potential influx of construction workers to the local area would be accompanied by an increase in economic activity from their spending in local business establishments. In addition, the planned new development projects would also make purchases from local businesses for construction materials and supplies, various kinds of services, etc.

The effects of the increased activity on local attitudes and quality of life may vary amongst residents. While some residents may be displeased by increased traffic, new visitors and temporary residents (particularly those employed or otherwise benefiting economically from the construction) could welcome the development.

However, an influx of new workers also could increase the demand for certain kinds of government services and infrastructure (e.g., police and fire services and medical facilities and services). There have been other past instances of rapid growth in rural areas as a result of energy-related development, most notably the energy boom in the 1970s in states such as Wyoming. A number of communities, such as Rock Springs and Gillette, Wyoming, became known as “boomtowns,” and the local economic benefits from the new energy development in the region were accompanied by some social changes that were not seen as positive by many existing residents. These included changes such as growth in number of bars, higher crime rates, and perceived (by some) aesthetic degradation due to rapid growth occurring to accommodate the sudden increase in population.

The presence of existing larger communities (such as Indio and Coachella) that are within possible commuting range for construction workers could suggest that circumstances may differ substantially from those facing the more isolated Wyoming boomtown communities 35 years ago. However, there would remain a potential for temporary impacts in the Blythe area, particularly if the possibility of such social and economic impacts are not unanticipated and are not managed.

### *Operations*

As discussed in the corresponding economic cumulative analysis, the proposed action’s future operations would be expected to have a minor and beneficial effect on the local and eastern Riverside County economy. Even conservatively assuming that up to 25 percent of the future operations labor force could be recruited from non-region residents, there would be an in-migration population of only 320 operations workers. There is likely to be more than sufficient available local housing to accommodate the housing needs of these workers and their families. Furthermore, the relatively limited number of new residents would not be expected to result in any noticeably change to the local communities’ social composition or character. The future operations of the solar projects also would generate significant annual economic benefits in local

employment, direct and indirect spending at local businesses as well as positive sales and other tax benefits for the local area. Consequently, the cumulative social and economic effect of the future operations of the solar projects would be minor and beneficial.

### *Decommissioning*

As discussed in the corresponding economic cumulative analysis, there is insufficient information to reliably project the conditions when decommissioning of the proposed facilities would occur in 30 to 40 years in to the future. Consequently it is highly speculative to attempt to characterize the future situation and circumstances under which facility decommissioning would occur.

In any case, the proposed action is expected to be one of many similar solar projects within the eastern Riverside County region. Consequently, from the current perspective and based on the currently and foreseeable future circumstance for the project and the region, there is no evidence to suggest that the future project decommissioning would have anything but at most a very minor adverse cumulative impact on the local and regional area's social environment.

## Alternatives

### *Reduced Acreage Alternative*

The construction spending and employment for the Reduced Acreage Alternative would be expected to be reduced from that for the proposed action and, consequently, the cumulative impact would be similarly reduced in magnitude.

### *No Action Alternative A*

The social and economic impacts associated with the proposed action would likely only be delayed by selecting No Action Alternative A, since this region of the United States has extremely positive characteristics for solar power generation. If this proposal were not approved, another application for a different solar generating facility or a different type of solar generating facility would likely be filed at some time in the future. An application could also be filed for a wind energy facility or any other kind of use and any cumulative impacts would result based on the specific use requested.

### *No Project Alternative B*

The social and economic impacts resulting from the proposed action would not occur under No Project Alternative B since the application would be denied and the plan amended to identify the land as unsuitable for solar energy generation. However, the land would remain open to other types of rights-of-way and/or land use authorizations, resulting in potential cumulative impact specific to a future use other than solar energy generation.

### *No Project Alternative C*

Cumulative impacts associated with the proposed action would likely only be delayed by selecting No Project Alternative C since this region of the United States has extremely positive

characteristics for solar power generation. If this Project were not approved, another application for a different solar generating facility would likely be filed at some time in the future.

## 4.13.4 Summary of Mitigation Measures

No mitigation is required.

## 4.13.5 Residual Impacts after Mitigation Measures were Implemented

No mitigation measure would be implemented and therefore no residual impacts would remain.

## 4.13.6 Unavoidable Adverse Impacts

No unavoidable adverse social or economic impacts would be expected to be associated with the proposed action.

# 4.14 Impacts on Soil Resources

## 4.14.1 Impact Assessment Methodology

Climatological data provided by the Western Regional Climate Center and soil data provided by the USDA soil survey were used to determine impacts affecting soil resources.

## 4.14.2 Discussion of Direct and Indirect Impacts

### Proposed Action

#### *Erosion*

Erosion is the displacement of solids (soil, mud, rock, and other particles) by wind, water, or ice and by downward or down-slope movement in response to gravity. Due to generally flat terrain, the GSEP site is not prone to significant mass wasting (gravity-driven erosion and non-fluvial sediment transport).

Grading of the GSEP site would result in a less than one percent slope downward from the north to the south of the site. Earthwork associated with the GSEP would include excavation for foundations and underground systems, and the total earth movement that would occur is approximately 1,000,000 cubic yards. Cut and fill would be balanced on site and there would be no need to either import or export earthen material.

The vast majority of the GSEP grading and excavation would occur on the GSEP site with only minor grading and excavation needed for the transmission line (at the locations of the monopoles) as well as the gas pipeline and access road. Known onsite soil types that would be affected by GSEP grading and excavation are listed in Section 3.15. The wind erosion hazard is moderate to high. During construction, the area within the plant site fence line (1,800 acres) would be disturbed. There also would be small, localized disturbance at the specific locations where transmission structures would be installed.

During construction, the surface of the disturbed areas would be devoid of vegetation and there would be the highest potential for erosion, as well as associated effects including soil loss and increased sediment yields downstream from disturbed areas.

##### Wind Erosion

The potential for soil loss by wind erosion was estimated using the Wind Erosion Prediction System (WEPS) model for pre-development (undisturbed), during construction, and operational conditions.

The area of the GSEP site and GSEP-related off-site linears has a moderate to high potential for wind and water erosion. According to WEPS simulations, wind erosion rates at the GSEP site are an order of magnitude higher than soil erosion by rainfall runoff at this location due to the relatively low annual rainfall amount and the presence of fine, sandy soils. The results are presented in Table 4.14-1 presented below.

**TABLE 4.14-1**
**ESTIMATE OF SOIL LOSS BY WIND EROSION USING WIND EROSION PREDICTION SYSTEM (WEPS) MODEL**

| Description | Acres | Predicted Soil Loss (tons per acre per year) | Wind Erosion Soil Loss (tons per year) |
|---|---|---|---|
| No GSEP | 1,800 | 72.88 | 131,184 |
| On-Site GSEP Construction (no BMPs) | 1,800 | 27.82 | 50,076 |
| On-Site GSEP Construction (with BMPs) | 1,800 | 1.25 | 2,250 |
| Off-Site Linear Construction (with BMPs) | 61 | 0.63 | 11 |
| GSEP Operation (with BMPs) | 1,650 | 1.25 | 2,063 |

SOURCE: CEC, RSA (June 2010) Soil & Water Table 14.

Under current conditions, these processes are in relative equilibrium with ongoing depositional processes and soil loss is estimated at approximately 72.88 tons per acre per year or 131,184 tons for the proposed GSEP area of 1,800 acres (WPAR, 2009). Construction without implementation of BMPs would result in a potential for soil loss of about 50,000 tons; however, the implementation of BMPs is expected to reduce water and wind erosion of soils during construction to less than 2,250 tons. Based on the conceptual grading plan (WPAR, 2009; see Appendix A in WPAR) for the GSEP site, construction would require cut and fill activities on the GSEP site, but import/export of earthen materials to and from the GSEP site would not be required.

Roads and paved areas would be kept free of dust, dirt and visible soil materials. Materials would be kept on site to implement temporary control measures during the operational life of the GSEP.

Impacts of GSEP operations on the proposed rerouted desert washes are discussed in the Vegetation Resources Section of this chapter (Section 4.17).

A solar thermal project must keep dust to a minimum, as a film on the collectors of the solar array would reduce their efficiency for power production. Dust control would be achieved by a combination of soil stabilizers, water from the collector washing and waste cooling water, and compaction of the driving surface over time. Therefore, operational controls designed to control dust are expected to reduce the overall soil erosion in the area. Therefore, potential construction and operational-related impacts to onsite soils would be confined to the GSEP site and related off-site linears.

### Water Erosion

For potential soil loss associated with water erosion, it was assumed that 100 percent of the GSEP site would be graded. Those estimates are detailed in Table 4.14-2.

To address the management of sediment transport, erosion, and sedimentation during operation, the GSEP design would incorporate diversion berms, channels, and detention basins. Dirt roads and exposed surfaces would be periodically treated with dust palliatives as needed to reduce wind

**TABLE 4.14-2**
**ESTIMATE OF SOIL LOSS BY WATER EROSION**
**USING REVISED UNIVERSAL SOIL LOSS EQUATION (RUSLE2)[a]**

| Feature (acreage)[b] | Activity | Duration (months)[c] | Soil Loss (tons/yr) w/o BMPs | Soil Loss (tons/yr) with BMPs | Soil Loss (tons/yr) No GSEP |
|---|---|---|---|---|---|
| GSEP Site<br>(1,800 acres total graded) | Grading<br>Construction | 6<br>9 | 441.0<br>1,396.5 | 6.93<br>21.95 | 1.53<br>--- |
| Roads<br>(15.76 acres) | Grading<br>Construction | 3 | | | |
| Transmission lines<br>(9.18 acres for construction;<br>0.05 acres for pole footprints) | Grading<br>Construction | 2<br>4 | 0.0041<br>1.499 | 0.000064<br>0.0236 | 0.00043<br>--- |
| Natural Gas Pipeline<br>(36.36 acres for construction;<br>2.91 acres for trench) | Grading<br>Construction | 2<br>3 | 0.238<br>4.454 | 0.0037<br>0.0699 | 0.00247<br>--- |
| GSEP Soil Loss Estimates<br>(Construction) | All activities listed above | 29[d] | 1,845.63 | 29.00 | 1.16 |
| GSEP Annual Soil Loss Estimate<br>(Operation) (1,650 acres exposed soil) | | 12 | | 12.71 | |

NOTES:

[a] Water Erosion Soil losses (tons/acre/year) are estimated using RUSLE2 software. (NRCS, 2002) The soil characteristics were estimated using RUSLE2 soil profiles corresponding to the mapped soil unit. Estimates of actual soil losses use the RUSLE2 soil loss times the duration and affected area. The No Project Alternative estimate does not have a specific duration, and loss is given in tons/year.

[b] Project Acreages based on the assumption that 100 percent of the project site will be graded. Off-site area acreages are based on project disturbance table for acreage outside the project footprint.

[c] Duration of activities based upon assumptions in the Plan of Development (Genesis Solar, LLC, 2009).

[d] Activities would not all be concurrent.

RUSLE2 ASSUMPTIONS:

100-ft slope length, 2 percent slope

***Construction and Grading*** soil losses assume the following inputs: Management - bare ground; Contouring - None, rows up and down hill; Diversion/terracing - None; Strips and Barriers - None.

***Construction and Grading with BMP and Annual Operational*** soil losses assume the following inputs: Management – Silt fence; Contouring - Perfect, no row grade; Diversion/terracing - None; Strips and Barriers- 2 fences, 1 at end of slope.

***No Project*** soil losses assume the following inputs: Management - Dense grass, not harvested; Contouring -None, rows up and down hill; Diversion/terracing - None; Strips and Barriers - None.

SOURCE: CEC, RSA (June 2010) Soil & Water Table 14; WPAR 2009.

erosion. Construction and maintenance of the proposed drainage and sediment management system at the GSEP site is expected to reduce water and wind erosion at, and downstream of, the GSEP site to less than significant levels.

## *Geomorphology*

The GSEP involves a series of solar arrays within a roughly 1,800 acre rectangular shaped parcel and linears (access road, gas line, transmission lines) involving approximately 90 acres. The method of construction is important in assessing the potential impact to geomorphological conditions associated with the solar arrays and linears. Solar array construction would involve mass grading that would require drainage to be intercepted up-gradient and routed around the arrays to the down-gradient side of the facility to continue flow. Construction of the linear facilities would involve placement of an underground gas line, electric transmission line towers,

and an access road. The underground gas line's finish grade would be close to existing ground surface contours and thus would have a minimal affect on aeolian systems. The overhead transmission lines would have a minimal effect on aeolian systems and only in areas of the proposed tower foundations. The current design for the proposed access road involves a low relief road close to existing contours that would not adversely affect aeolian sand migration but may require some special design considerations where it crosses existing drainages.

### Impacts to the Qal

The Holocene Quaternary alluvium (Qal) and Pleistocene Quaternary alluvium (Qoa) are relatively stable surfaces, with little evidence of active sand transport. The presence of the gravel with desert pavement and varnish is evidence that these surfaces are also stable from a fluvial perspective (i.e., that the small channels, while potentially prone to lateral migration and avulsion across the stable surface, do not tend to cut vertically into the surface). From a geomorphic perspective, construction of the GSEP on the Qal and Qoa areas should have relatively little off site impact. Because there is little sediment transport occurring on these surfaces, construction of the proposed GSEP does not appear likely to disrupt the movement of sediment to habitat areas elsewhere. No mitigation is required or proposed.

### Impacts to the Qsr

The relict Quaternary sand (Qsr) is a relatively stable surface, with little evidence of active sand transport. The presence of the soil horizons and surface lag is evidence that this surface is also stable from a fluvial perspective (i.e., that the small channels, while laterally active, do not tend to downcut or fill vertically). From a geomorphic perspective, construction of the GSEP on the Qsr area should have relatively little off site impact. Because there is little sediment transport occurring on this surface, construction of the proposed GSEP does not appear likely to disrupt the movement of sediment to habitat areas elsewhere. No mitigation is required or proposed.

### Impacts to the Qsad/Chuckwalla Sand Transport Corridor

The western array avoids the Chuckwalla sand transport corridor as mapped by Dr. Kenney (WPAR, 2010). The eastern array intrudes into the corridor by approximately 1,600 feet at a point where the corridor is 24,000 feet wide. This intrusion represents about 7 percent of the Chuckwalla sand corridor width. This part of the corridor does not appear to be the most active with regard to sediment transport rates (based on the amount of sand in storage on the ground, evidence for sand transport from ripples and coppice dunes, etc.), so the reduction in sediment transport capacity is not considered a significant impact. Based on the degree of intrusion into the corridor and the length of the intrusion, it was estimated that an area of 157 acres of vegetated sand dune (Qsad) downwind of the intrusion might be expected to experience moderate impacts from loss of sand due to the GSEP site.

It is recommended that the GSEP minimize encroachment of the main footprint into the Qsad/sand transport corridor.

### Impacts to the Palen-McCoy Sand Transport Corridor

As originally configured, the eastern solar array of the GSEP intruded into the outer edges of the Palen-McCoy Valley Sand Transport Corridor, which delivers sand to Mojave fringe-toed lizard habitat downwind. The Applicant estimated that the easternmost end of the GSEP's eastern solar array extended approximately 1000 feet (19 percent) of the width of this corridor (Worley Parsons 2010c). The Applicant recently revised their GSEP footprint (TTEC 2010o) to eliminate 41.4 acres of the easternmost array, thus avoiding intrusion into the Palen-McCoy Valley Sand Transport Corridor.

Although the magnitude of impact to the entire wind transport corridor is relatively low, the area of off-site impacts immediately downwind of the GSEP is large: the lee area downwind of the GSEP that is likely to experience sand depletion is 309 acres. Since there are 13 acres of overlap from both wind shadows, the combined area impacted by intrusions into both corridors is 453 acres. This area would be expected to experience deflation (loss of sand from the existing vegetated dunes over time) and armoring (coarsening of the sand and gravel as fine sand is eroded by the wind).

### Impacts to the Qsa

The Qsa is the active area of sand dunes supplied by wind and water transport from the Palen – McCoy Valley sand corridor. This corridor supplies significant sand dune habitat downwind. This area is crossed by the laterals near Wiley Wells Rest Stop.

The main GSEP footprint should avoid this area completely since large scale obstruction of this unit would be hard or impossible to mitigate for. The GSEP should be able to avoid or minimize impacts created by the laterals within this zone by avoiding creation of barriers to wind and water transport. Most wind-borne transport of sand occurs within 3 feet of the ground, so infrastructure should be constructed flush with the surrounding ground surface and without ground level obstructions. Power pylons should not pose a significant problem due to their small surface area at ground level. Water and gas pipelines should be buried below ground. Road surfaces should be flush with the ground surface. There should not be drainage ditches running perpendicular to the wind direction (approximately north-south in the northern section of the lateral route, shifting to west-east in the southern area).

## Alternatives

### *Reduced Acreage Alternative*

This Alternative would essentially be Unit 1 of the proposed GSEP. The Alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed GSEP area so all impacts are reduced, and (2) by eliminating the eastern solar field, it would reduce the water required for wet cooling by 50 percent.

Soil erosion could be impacted as a result of the construction and operation under this alternative. Impacts related to soil erosion from wind and surface water are anticipated to be similar to those

associated with the proposed GSEP; an exception would be Aeolian erosion and transport, which would be reduced to near zero through elimination of the eastern solar array.

The GSEP construction activities would disturb soils at the site and along the linear facilities route(s). It is at the time of this disturbance that there would be the highest potential for erosion, as well as associated effects including soil loss and increased sediment yields downstream from disturbed areas. It is expected that BMPs would be utilized to minimize the impacts of soil erosion during construction to less than significant.

The Alternative removes the proposed eastern solar array from the GSEP. Since the main geomorphic impacts identified in this report are associated with the eastern solar array this alternative would have lower impacts, with no impact on the Chuckwalla and Palen-McCoy sand corridors or on the eastern wash complex. No mitigation is required or proposed.

### *Dry Cooling Alternative*

Approximately 18 fans would be required for each air-cooled condenser (ACC). The 18 fans would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees only 10 of the fans would be used (GSEP 2009f). The ACC described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required. In addition to the ACC and fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (ac-ft/yr) to 66 ac-ft/yr). This reduction in water use would primarily reduce impacts to water and biological resources.

This alternative is located entirely within the boundaries of the proposed GSEP. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed GSEP.

Wet cooling maximizes power plant fuel efficiency by providing a continuous source of effective cooling for the plant's steam condensers. Dry cooling would typically provide less effective cooling of the condensers, reducing the efficiency of the steam cycle portion of the power plant, and thus the overall fuel efficiency of the facility.

The FSA for the Beacon Solar Energy Project (08-AFC-2; BSEP 2009 as cited in the CEC RSA June 2010) showed that annual average fuel efficiency would be reduced 5-7 percent compared to a wet cooling system. The GSEP applicant stated that use of dry cooling would result in a 7.4 percent decrease in total annual net megawatt hours compared with a wet cooling system (GSEP 2009a).

The GSEP applicant states that the proposed GSEP has been optimized for the land available, and therefore solar field expansion infeasible (GSEP 2009a). However, the power block and solar

arrays would occupy approximately 1,360 acres of the 1,800-acre site. Evaporation ponds, access roads, administration buildings, and other support facilities would require a portion of the 1,800-acre site, and there is also remaining open space (GSEP 2009a). Additionally, use of dry-cooling would require smaller evaporation ponds opening up additional land for solar field expansion. A 12 percent increase in the solar field would require approximately an additional 150 acres. While it is uncertain whether the entire 150 acres is available for use and would comply with the engineering requirements for GSEP, it is clear from the site plan that there is some available land immediately adjacent to existing solar trough rows and this land could be used to offset all or a portion of the efficiency loss due to the use of dry-cooling.

Because the ACC system would not require any additional ground disturbance other than what would be required for the proposed GSEP with the use of wet-cooled towers, impacts to soil resources from use of the Dry-Cooling Alternative would be expected to be similar as for the proposed GSEP. Erosion impacts would be expected to be similar; however, the ACC system would potentially require some increase in truck traffic and related erosion due to the larger size of the system.

### *No Action Alternative A*

Under this alternative, the proposed GSEP would not be approved by the BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the GSEP site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the impacts to soils and water from the construction and operation of the proposed GSEP would not occur. However, the land on which the GSEP is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of the GSEP, other renewable energy projects may be constructed to meet State and federal mandates, and those projects would have similar impacts in other locations.

### *No Project Alternative B*

Under this alternative, the proposed GSEP would not be approved by the BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, impacts to soils and water would result from the construction and operation of the solar technology and resulting ground disturbance and would likely be similar to the impacts to soils and water from the proposed GSEP, including erosion impacts and impacts to jurisdictional waters. Different solar technologies require different amounts of grading; however, it is expected that all solar technologies would require grading and

maintenance. As such, this No Project Alternative could result in impacts to soils and water similar to the impacts under the proposed GSEP.

### *No Project Alternative C*

Under this alternative, the proposed GSEP would not be approved by the BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the GSEP site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no soil erosion impacts or impacts to jurisdictional waters. As a result, this No Project Alternative would not result in the impacts to soils and water under the proposed GSEP. However, in the absence of this GSEP, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

## 4.14.3 Discussion of Cumulative Impacts

Impacts resulting from construction, operation, maintenance, and decommissioning of the GSEP could result in a cumulative effect on soils resources with other past, present, or reasonably foreseeable future actions. The geographic scope of the cumulative effects analysis for soils consists of the Mojave Desert Air Basin, since soils could be transported offsite by wind, and the watershed boundary, since surface flows also could carry eroded soils off-site. Potential cumulative effects on soil resources could occur at any point during the overall lifespan of the GSEP, from pre-construction activities to the conclusion of facility closure and site reclamation.

Existing conditions within the Area of Potential Effects (APE) reflect a combination of the natural condition and the effects of past actions and are described in this PA/FEIS Chapter 3. Direct and indirect effects of the GSEP are discussed above. In general, construction of the proposed action would result in temporary changes at the site that could incrementally increase local wind-borne soil erosion and storm water runoff during construction. However, the GSEP would be expected to contribute only a small amount to any possible short-term cumulative impacts related to soil erosion, because the Applicant would be required to implement the mitigation measures specified below. Operation of the proposed action would result in permanent changes at the GSEP site. These changes could incrementally increase local soil erosion and storm water runoff. The proposed action would not be expected to cumulatively contribute to these possible long-term operational cumulative impacts because potential GSEP related soil erosion and increased sedimentation resulting from storm water runoff are expected to be reduced to an acceptable level through implementation of the mitigation measures specified below. Nonetheless, these incremental contributions to air- or water-borne erosion and sedimentation could combine with the incremental impacts of other past, present, and reasonably foreseeable future actions making up the cumulative scenario (see Section 4.1). Construction or maintenance

activities, including grading, compaction, drilling, back-filling, driving on unpaved roadways, etc., could disturb soils at any work site, regardless of the type of project and regardless of the phase of its development. However, the combined vegetation removal anticipated as a result of the numerous proposed utility-scale renewable energy projects, including the GSEP, could expose soils to higher wind-borne erosion rates than the area otherwise would be exposed to. This also could exacerbate runoff rates, especially during high intensity, short duration rainfall events. The Reduced Acreage Alternative, Dry Cooling Alternative, the No Action Alternative, and No Project Alternatives could be expected to contribute to a cumulative impact on soil resources in proportion to the amount of soil disturbance that could occur pursuant to each.

## 4.14.4 Summary of Mitigation Measures

The implementation of mitigation measures imposed by the Energy Commission as Conditions of Certification for the GSEP also would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G. The following mitigation measures would avoid or minimize impacts on soil resources:

SOIL&WATER-1, SOIL&WATER-3, SOIL&WATER-4, SOIL&WATER-5
SOIL&WATER-11, SOIL&WATER-14, SOIL&WATER-17

## 4.14.5 Residual Impacts after Mitigation Measures were Implemented

Residual soil resource impacts are the increased soil loss from construction and operation as outlined in Tables 4.14-1 and 4.14-2.

## 4.14.6 Unavoidable Adverse Impacts

None.

# 4.15 Impacts on Special Designations

## 4.15.1 Impact Assessment Methodology

This section was prepared using information contained within the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO)

## 4.15.2 Discussion of Direct and Indirect Impacts

### Proposed Action

The proposed action would have no direct effects on special designations, since the site is not subject to any such designation, no new designations or amendments to existing designations are proposed; however, it could affect values inherent to five specially designated wilderness areas: the Palen/McCoy Wilderness, Chuckwalla Mountains, Joshua Tree, Palo Verde Mountains and Little Chuckwalla Mountains Wilderness areas. The proposed action would not impact the seven ACECs located in the vicinity of the site or other special designations, such as wilderness study areas, national trails, or wild and scenic rivers.

Visitor experience within the south portion of the Palen/McCoy Wilderness could be affected by the proposed action. The Palen-McCoy Wilderness abuts the northern boundary of the GSEP site. This wilderness does not have maintained trails or trail heads, and is scarcely visited by the public (BLM Greg Hill, 2009). Nevertheless, because the wilderness area is physically accessible, it may be visited on rare occasions by backcountry hikers. Such visitors within sight of the project area could experience negative impacts from construction noise, fugitive dust, vehicle movement, and other “non-natural” construction activities and structures caused by the proposed action. These impacts could affect wilderness users’ perception of solitude, naturalness and unconfined recreation. Upon project completion, the solar arrays and associated infrastructure would be visible to visitors within the south portion of the wilderness, thus affecting their perception of naturalness, solitude and unconfined recreational experiences.

The Chuckwalla, Joshua Tree, Palo Verde Mountains and Little Chuckwalla Mountains wildernesses are located within a 20-mile radius of the GSEP site. The Chuckwalla Mountains Wilderness is approximately 7 miles southwest; the Little Chuckwalla Mountains Wilderness is approximately 8 miles south; the Joshua Tree Wilderness is 15 miles northwest; and the Palo Verde Mountains Wilderness is 15 miles southeast. Users of these wilderness areas would experience a more industrialized valley, but the industrialized valley is not within the wilderness area and opportunities for solitude and unconfined recreation would not be greatly affected. Reduction in groundwater levels would have an indeterminate affect on wilderness values within the basin.

The proposed action would not impact the seven ACECs located in the vicinity of the site (i.e., the Mule Mountains, Chuckwalla Valley Dune Thicket, Palen Dry Lake, Chuckwalla Desert Wildlife Management Area, Desert Lily Preserve, Corn Springs and Alligator Rock ACECs) as these were established to protect cultural and biological resources, and visitor use to these areas is

a secondary resource benefit. The Mule Mountains ACEC is located approximately 12 miles southeast of the site; the 2,273-acre Chuckwalla Valley Dune Thicket ACEC is located approximately five miles south of the site, the Palen Dry Lake ACEC abuts the southwest corner of the GSEP total proposed right of way, but is five miles west of the proposed area of disturbance; the Chuckwalla Desert Wildlife Management Area is five miles south of the site; the Desert Lily Preserve ACEC is 15 miles northwest of the site; the Corn Springs ACEC is 15 miles southwest of the site; and the Alligator Rock ACEC is located 15 miles west of the site. Recreation uses allowed in ACECs are discussed in FEIS Section 3-13. Since the nearest ACEC is roughly five miles west of the proposed area of disturbance, these ACEC's can be considered to be isolated from potential impacts that could be caused by construction, operation and maintenance, and closure and decommissioning of the proposed GSEP.

The proposed action would not impact other special designations, such as wilderness study areas, national trails, or wild and scenic rivers because no such areas are located in the vicinity of the GSEP site.

The project is within a former WSA that has wilderness character. The project area is in a natural condition, with the imprints of man substantially unnoticeable. However, the project area has outstanding opportunities for solitude and primitive kinds of recreation only in conjunction with the contiguous Palen/McCoy Wilderness area to the north. The 1,800 acres of development on the project site would be very apparent and obliterate all natural character on the site. After the project is phased out, reclamation of those drainage basins followed by flooding of indeterminate frequency would ameliorate those imprints of man. The vegetative community would restore to a density comparable to adjacent areas in an uncertain, but estimated to be several decades, time thereafter.

## Alternatives

### *Reduced Acreage Alternative*

Assuming that this alternative retained the same vertical height for the tallest structure as the proposed action, then the viewshed would be the same as the proposed action and views from within the Palen/McCoy Wilderness would be the most directly impacted. Reduction in groundwater levels would have an indeterminate affect on wilderness values within the basin.

The project is within a former WSA that has wilderness character. The project area is in a natural condition, with the imprints of man substantially unnoticeable. However, the project area has outstanding opportunities for solitude and primitive kinds of recreation only in conjunction with the contiguous Palen/McCoy Wilderness area to the north. The 900 acres of development on the project site would be very apparent and obliterate all natural character on the site. After the project is phased out, reclamation of those drainage basins followed by flooding of indeterminate frequency would ameliorate those imprints of man. The vegetative community would restore to a density comparable to adjacent areas in an uncertain, but estimated to be several decades, time thereafter.

### *Dry Cooling Alternative*

The dry cooling alternative would result in the same impacts to existing special designations as the proposed action. All facilities proposed under this alternative would generally be located within the GESP facility footprint. Therefore the viewshed would be the same as the proposed action and views from within the Palen/McCoy Wilderness would be the most directly impacted. Reduction in groundwater levels would have an indeterminate affect on wilderness values within the basin.

The project is within a former WSA that has wilderness character. The project area is in a natural condition, with the imprints of man substantially unnoticeable. However, the project area has outstanding opportunities for solitude and primitive kinds of recreation only in conjunction with the contiguous Palen/McCoy Wilderness area to the north. The 1,800 acres of development on the project site would be very apparent and obliterate all natural character on the site. After the project is phased out, reclamation of those drainage basins followed by flooding of indeterminate frequency would ameliorate those imprints of man. The vegetative community would restore to a density comparable to adjacent areas in an uncertain, but estimated to be several decades, time thereafter.

### *No Action Alternative A and No Project Alternative B*

Under No Action Alternative A and No Project Alternative B, the ROW application would be denied and the ROW grant would not be authorized. Under No Action Alternative A, the CDCA Plan would not be amended; by contrast, under No Project Alternative B, the CDCA Plan would be amended to identify the application area as unsuitable for any type of solar energy development. Regardless of whether the CDCA Plan amendment occurs, neither of these alternatives would result in direct or indirect impacts to special designations. Groundwater levels would have not be affected and there would be no effect on wilderness values within the basin. Wilderness characteristics on the project site would be retained.

### *No Project Alternative C*

If No Project Alternative C were selected, the ROW application would be denied, the ROW grant would not be authorized, and the CDCA Plan would be amended to identify the application area as suitable for any type of solar energy development. Consequently, No Project Alternative C could impact special designation values to the same degree and extent as the proposed action. However, it also could have a greater or lesser impact than the proposed action, depending on the type (different technologies could have different height, area, reflectivity or other characteristics), acreage (different technologies or proposals could require more or less land) and intensity of future development on the site. Wilderness characteristics on the project site would be retained. Groundwater levels would have not be affected and there would be no effect on wilderness values within the basin. Wilderness characteristics on the project site would be retained.

## 4.15.3 Discussion of Cumulative Impacts

Incremental impacts on wilderness areas resulting from the GSEP could combine with the incremental impacts of past, present, or reasonably foreseeable future actions to cause or contribute to a cumulative impact. The cumulative impacts area for potential cumulative impacts on these designated areas includes the range of areas from which sights, sounds, structures and other activities or developments could affect wilderness users' opportunities for solitude, naturalness and unconfined recreation within the Palen/McCoy, Big Maria Mountains, and Little Chuckwalla Mountains Wilderness Areas. Potential cumulative impacts could occur for the entire duration of the proposed action, from the initiation of construction to the conclusion of facility closure and site restoration.

Existing conditions within the cumulative impacts area reflect a combination of the natural condition and the effects of past actions and are described in FEIS Chapter 3. Indirect effects of the GSEP are analyzed above. Past, present and reasonably foreseeable future actions making up the cumulative scenario are identified in Section 4.1. Numerous energy-related development projects, including the proposed action, would adversely affect the viewscape by adding structures, fences and other features that could cause glint or glare or otherwise interrupt landscape views; would cause increased noise caused by equipment required for construction and operation, motor vehicle use, voices, music or other worker-related sounds; and would add facilities and structures to the landscape that are not currently present. Any of these activities individually or in combination could cause some users to seek out other areas of the desert for their wilderness activities and experiences.

These potential cumulative impacts on specially-designated wilderness areas could, in turn affect visitor attraction to other specially-designated areas along the I-10 corridor, including the ACECs mentioned above, since the myriad projects in the cumulative scenario, in combination, would add large- and small-scale industrial, utility-related and other uses in the region. To the extent that No Action Alternative A and No Project Alternative B would not result in development of the site, no cumulative impact on special designations would occur.

## 4.15.4 Summary of Mitigation Measures

All water sources within the wilderness areas in the basin will be inventoried. All federal and other appropriations will be identified. The US will identify as a federal reserved water right all remaining, as of October 31, 1994, un-appropriated water within the wilderness areas.

## 4.15.5 Discussion of Cumulative Impacts

Incremental impacts on specially-designated wilderness areas resulting from the GSEP could combine with the incremental impacts of past, present, or reasonably foreseeable future actions to cause or contribute to a cumulative impact. The cumulative impacts area for potential cumulative impacts on these specially designated areas includes the range of areas from which sights, sounds, structures and other activities or developments could affect wilderness users' opportunities for solitude, naturalness and unconfined recreation within the Palen/McCoy Wilderness, Big Maria

Mountains and Little Chuckwalla Mountains Wilderness Areas. Potential cumulative impacts could occur for the entire duration of the proposed action, from the initiation of construction to the conclusion of facility closure and site restoration.

Existing conditions within the cumulative impacts area reflect a combination of the natural condition and the effects of past actions and are described in FEIS Chapter 3. Indirect effects of the GSEP are analyzed above. Past, present and reasonably foreseeable future actions making up the cumulative scenario are identified in Section 4.1.Numerous energy-related development projects, including the proposed action, would adversely affect the viewscape by adding structures, fences and other features that could cause glint or glare or otherwise interrupt landscape views; would cause increased noise caused by equipment required for construction and operation, motor vehicle use, voices, music or other worker-related sounds; and would add facilities and structures to the landscape that are not currently present. Any of these activities individually or in combination could cause some users to seek out other areas of the desert for their wilderness activities and experiences.

These potential cumulative impacts on specially-designated wilderness areas could, in turn affect visitor attraction to other specially-designated areas along the I-10 corridor, including the ACECs mentioned above, since the myriad projects in the cumulative scenario, in combination, would add large- and small-scale industrial, utility-related and other uses in the region. To the extent that No Action Alternative A and No Project Alternative B would not result in development of the site, no cumulative impact on special designations would occur.

## 4.15.6 Summary of Mitigation Measures

None.

## 4.15.7 Unavoidable Adverse Impacts

Unavoidable impacts to designated wilderness areas would result because construction and operation of the proposed action would alter the adjacent scenery to a more industrial setting, as viewed from within the wilderness. The existing landscape setting would be restored upon reclamation. Thus, the effects on wilderness experiences would continue until project facilities are dismantled and the desert vegetation and landforms of the site reclaimed.

# 4.16 Impacts on Transportation and Public Access – Off Highway Vehicle Resources

## 4.16.1 Impact Assessment Methodology

### Public Access

The CDCA and NECO Plan, which includes a detailed inventory and designation of open routes in the vicinity of the GSEP, was reviewed to determine impacts to open routes.

#### *Transportation*

This analysis focuses on potential impacts related to the construction, operation and decommissioning of the GSEP on the surrounding transportation systems and roadways based on the Energy Commission's Revised Staff Assessment (CEC RSA, June 2010). For impacts to local transportation systems, the Energy Commission evaluated impacts based on level of service (LOS) determinations, which is a generally accepted measure used by traffic engineers, planners, and decision-makers to describe and quantify the congestion level on a particular roadway or intersection in terms of *speed*, *travel time*, and *delay*.

In addition, the Energy Commission used methodology contained in the *Highway Capacity Manual 2000* to determine potential impacts to intersections from operations of the proposed action. This methodology was used to assess delays at an unsignalized intersection for movements operating under traffic control—a stop sign, for example. For an intersection at which the only stop-sign is placed at a side street, delay would be reported for movements controlled by the stop sign. The delay then would be assigned a corresponding letter grade to represent the overall condition of the intersection or level of service. These grades range from LOS A, free-flow, to LOS F, poor progression.

The assessment of transportation-related impacts is based on evaluations and technical analyses designed to compare the pre-GSEP conditions to the post-GSEP conditions.

## 4.16.2 Discussion of Direct and Indirect Impacts

### Proposed Action

#### *Public Access*

##### OHV Routes

The proposed linear ROW would cross five (5) approved open routes. This route crosses the southeastern end of the proposed linear ROW (see Figure 3.13-1). All open route crossings are within the immediate vicinity of I-10 with multiple alternate access points. Observations by BLM staff and Law Enforcement Rangers indicate that use is relatively low on routes within the vicinity of the GSEP site, not exceeding 200-300 visits per year. Construction of the proposed linear routes across these open NECO routes would result in temporary disruptions to motorized

vehicle use along these routes. In addition, transmissions poles may be constructed within the route, which may result in temporary closure of the route during construction. Users of the established route would not be allowed to detour onto the linear ROW and would not disturb native plants and animals. The western portion of the requested ROW also crosses three NECO routes; however, because the Proposed Action, Dry Cooling Alternative, nor the Reduced Acreage alternative involves construction in the western ROW, none of these three routes would be impacted temporarily or permanently.

#### Washes Open Zones

The GSEP is within a Washes Open Zone, however there are no navigable washes identified in the project area.

### *Transportation*

#### Construction

**Workforce.** Construction of the GSEP would be completed over an approximately 37-month period beginning in late 2010. The construction workforce would peak during month 23 at approximately 1,100 workers per day and average approximately 650 workers over the course of construction. Construction of the transmission line is expected to require a limited crew with fewer than 25 workers during peak periods. However, the transmission line construction schedule would not coincide with the peak of plant site construction employment.

The worst-case scenario, where all workers commute in automobiles with only one occupant per vehicle, yields a peak trip generation of approximately 1,100 inbound trips during the morning peak period and another 1,100 outbound trips during the evening peak hour. In the worst-case scenario, one-way worker trips would peak at 2,200 trips per day and an average of 1,400 one-way trips per day. Construction would also generate an average of approximately 15 to 20 one-way, truck trips per day with a peak of approximately 50 to 75 truck trips per day. The peak time for truck travel would occur during the construction of the foundation for the plant site and would not coincide with the peak onsite worker commute timeframe (month 23 in 2012).

To accommodate the worst-case scenario, a temporary parking area of approximately eight acres would be required for construction personnel parking (assuming 350 square feet per vehicle) with additional area required for the staging and laydown of equipment, materials, and supplies. The project would include onsite laydown and parking areas during construction. Those areas would be relocated around the site as construction progresses. Safety and efficiency concerns require on-site parking and laydown areas. That is, a traffic hazard could occur if workers were to park on public roadways or if public roadways were used for the staging and laydown of equipment, materials, and supplies. Such a hazard could adversely impact the LOS on I-10 as well as the safety of the workers and drivers.

The construction workforce would be drawn from the surrounding local and regional area, including a small number from the greater Los Angeles Basin. See FEIS Section 4.13. Project construction traffic from the Los Angeles, Palm Springs, and Indio areas is expected to follow

I-10 east to the site. Workers traveling from Blythe and the Arizona towns of Quartzsite, Ehrenberg, and Cibola would follow I-10 west to the site.

A large portion of the construction workforce is expected to come from or at least be temporarily housed in the Blythe and Indio areas (including Coachella, Thermal, and Mecca). These workers would also approach the site following I-10 from the west. Drivers approaching from Blythe itself would generally follow I-10 westerly to Wiley Well Road where they would exit to the north and follow the proposed access road to the site.

Traffic from the Brawley/ El Centro area is expected to follow State Route 78 north to I-10 and I-10 west to Wiley Well Road. Traffic from the Indio/ Palm Springs area and points west would follow I-10 east to Wiley Well Road and the site.

In addition, several pieces of equipment that exceed roadway load or size limits would need to be transported to the site via I-10 during construction. This equipment includes the steam turbine generator and main transformers. The equipment would be transported using multi-axle trucks. To transport this equipment, the Applicant must obtain special ministerial permits from Caltrans to move oversized or overweight materials. In addition, the Applicant must ensure proper routes are followed; proper time is scheduled for the delivery; and proper escorts, including advanced warning and trailing vehicles as well as law enforcement control are available, if necessary. These roadways could be damaged due to GSEP-related construction activities.

See the following Traffic and Transportation tables for information about traffic volumes for roads and intersections used to access the site:

1. Table 4.16-1, Comparison Construction Year (2012) Roadway Segment Level of Service
2. Table 4.16-2, Comparison of Standard Operations (Year 2012) Traffic on Study Roadways
3. Table 4.16-3, Standard Operations (Year 2012) Roadway Segment Level of Service Summary

As Table 4.16-1 depicts, the LOS in 2012 for the three study intersections without the project would remain at LOS A. With the addition of GSEP construction traffic, LOS would change from A to B at one intersection, the I-10 interchange at Wiley's Well Road east of the project site. LOS B is an acceptable level of service on California state highways.

This decrease in the LOS at this intersection is consistent with the proposed construction traffic patterns as it is anticipated approximately 75% of the traffic would utilize the eastbound Wiley's Well Road Interchange. Traffic volumes would increase from 3,700 ADT to 4,520 ADT. As a result of this increase, vehicles could become stacked as drivers exit I-10.

While traffic volumes would increase, the LOS at the study intersections and roadway segments would remain within the LOS thresholds identified by the state and local jurisdictions. All study roadway segments and intersections are expected to operate at LOS A and at LOS B at one intersection with the GSEP-related construction traffic as shown in Table 4.16-1.

**TABLE 4.16-1**
**COMPARISON OF CONSTRUCTION YEAR (2012) ROADWAY SEGMENT LEVEL OF SERVICE**

| Roadway Segment | 2012 Conditions without GSEP Construction Traffic[a] | | | 2012 Conditions with GSEP Construction Traffic[b] | | |
|---|---|---|---|---|---|---|
| | ADT | Capacity | LOS | ADT | Capacity | LOS |
| I-10 at Wiley's Well Road, West of the Project Site | 3,350 | 6,800 | A | 3,623 | 6,800 | A |
| I-10 at Wiley's Well Road, East of the Project Site | 3,700 | 6,800 | A | 4,520 | 6,800 | B |
| US-95 at Hobsonway, North of Blythe | 450 | 2,000 | A | 655 | 2,000 | A |

NOTES:

[a] Year 2008 traffic volumes expanded to Year 2012 at historical rates from Year 2004 to 2008 (3.8% for Wiley's Well Road west; 6.8% for Wiley's Well Road east and 8.6% for US-95).
[b] Month 23 peak construction traffic with 1,093 workers (Assumes 75% traveling from the east and 25% traveling from the west.)

SOURCE: RSA 2010.

**TABLE 4.16-2**
**COMPARISON OF STANDARD OPERATIONS (YEAR 2012) TRAFFIC ON STUDY ROADWAYS**

| Roadway Segment | Standard Operations Year 2012 Without GSEP[a] | | Standard Operations Year 2012 With GSEP[b] | | Percent Change Associated with GSEP |
|---|---|---|---|---|---|
| | ADT | Capacity[c] | ADT | Capactiy[c] | |
| I-10 at Wiley's Well Road, West of the Project Site | 3,350 | 6,800 | 3,367 | 6,800 | 0.5% |
| I-10 at Wiley's Well Road, East of the Project Site | 3,700 | 6,800 | 3,750 | 6,800 | 1.35% |
| US-95 at Hobsonway, North of Blythe | 450 | 2,000 | 462 | 2,000 | 2.7% |

NOTES:

[a] Year 2008 traffic volumes expanded to Year 2012 at historical rates from Year 2004 to 2008 (3.8% for Wiley's Well Road west; 6.8% for Wiley's Well Road east and 8.6% for US-95)
[b] Project operations with 66 employees (Assumes 75% traveling from the east and 25% traveling from the west; split shifts spread over a 24 hour period.)
[c] Two-way capacity in vehicles per hour.

**TABLE 4.16-3**
**STANDARD OPERATIONS (YEAR 2012) ROADWAY SEGMENT LEVEL OF SERVICE SUMMARY**

| Roadway Segment | Standard Operations Year 2012 Without GSEP[a] | | Standard Operations Year 2012 with GSEP[b] | |
|---|---|---|---|---|
| | ADT | LOS | ADT | LOS |
| I-10 at Wiley's Well Road, West of the Project Site | 3,350 | A | 3,367 | A |
| I-10 at Wiley's Well Road, East of the Project Site | 3,700 | A | 3,750 | A |
| US-95 at Hobsonway, North of Blythe | 450 | A | 462 | A |

NOTES:

[a] Year 2008 traffic volumes expanded to Year 2012 at historical rates from Year 2004 to 2008 (3.8% for Wiley's Well Road west; 6.8% for Wiley's Well Road east and 8.6% for US-95)
[b] Project operations with 66 employees (Assumes 75% traveling from the east and 25% from the west; split shifts over a 24 hour period.)

### *Construction Truck Traffic*

GSEP construction is expected to generate approximately 15 to 20 one way truck trips per day peaking at approximately 50 to 75 trucks per day. The peak truck travel would not coincide with the peak month 23 construction timeframe.

In addition to the standard equipment, several pieces of equipment that exceed roadway or size limits would need to be transported to the GSEP site via I-10 during construction. This equipment includes the steam turbine generator and main transformers. The AFC indicated this equipment would have been delivered via the Arizona and California Railroad Company at either Vidal, California or Parker, Arizona. However, as previously discussed, rail service has since been eliminated. As a result, the nearest siding to the project site would be the Parker site. The equipment would be transported using multi-axle trucks from US-95 to I-10. To transport this equipment along highway corridors, the applicant must obtain special permits from the Department of Transportation (Caltrans) to move oversized or overweight materials. The Department of Transportation (Caltrans), District 8, commented that GSEP would be required to obtain permits for vehicles/load exceeding limitations on size and weight.

Oversized or overweight trucks with unlicensed drivers could be hazardous to the general public and/or damage roadways.

### *Parking Capacity*

The project would include a temporary parking area of approximately nine acres for construction workers, based on 350 square feet per vehicle. The parking area would be relocated around the site as construction progresses. An additional area would be required for staging and laydown of equipment, materials and supplies. This staging and laydown area would also be relocated around the site as construction progresses.

The parking area would accommodate all construction workforce vehicles if workers commuted individually; however, based on the traffic control plan which would include staggered work hours and incentives for carpooling, such as employer-sponsored Commuter Check Program, this parking area would be oversized.

During operations, employees would park on-site in a combined administration/parking area. Figure 2-2 depicts the administration and warehouse covering approximately 39,000 square feet. Approximately 23,100 square feet would be required for the parking area, based on 350 square feet per vehicle which would accommodate approximately 66 vehicles. This would adequately accommodate the 66-employee workforce, as employees would not be on-site simultaneously as they would work different shifts to staff the GSEP 24 hours a day, 7 days a week.

With the proposed construction parking area on-site as well as on-site parking for operational employees, the project would not result in any parking spill-over to sensitive areas.

## Operation Impacts

Due to the nature and remote location of the GSEP project, a relatively minor amount of traffic would be generated to and from the site during standard operations.

Operation of the facility would require a labor force of up to 66 full-time employees operating round-the-clock. In a worst-case scenario, where all workers commute with only one occupant per vehicle, would generate 132 employee commute trips spread over a 24-hour period.

In addition, GSEP would generate approximately 38 truck trips per month (average of one to two truck trips per day) for delivery of materials and supplies. Approximately 15 of these truck trips per month would be for the delivery of hazardous materials. Delivery drivers and workers would use the Wiley's Well Road interchange from either eastbound or westbound I-10 to access the site.

These trip additions of employees or deliveries would not cause a significant impact to the highways. It is anticipated the LOS will remain at LOS A. Table 4.16-2 includes information regarding the expected traffic volumes during standard operations with the base traffic volumes on the study roadway segments. The average daily traffic (ADT) volumes are expected to remain low. As indicated, the study roadway segments are expected to experience a nominal increase in GSEP-related traffic.

Table 4.16-3 includes information regarding the level of service of the study roadway segments during standard operations. As shown, the study roadway segments are expected to operate at the same condition, LOS A, as in existing conditions.

## Alternatives

### *Reduced Acreage Alternative*

#### Public Access

Impacts to the OHV open route located within the proposed linear ROW would generally be the same as the proposed action because under this alternative, the proposed linear facilities would still cross the OHV open route. Impacts related to construction, operation and maintenance, and closure and decommissioning of this alternative would be similar to the proposed action.

#### Transportation

Since implementation of the Reduced Acreage Alternative does not significantly affect the number of workers needed for construction and operation, impacts would be similar to the proposed action.

### *Dry Cooling Alternative*

#### Public Access

Impacts to the OHV open route located within the proposed linear ROW would be the same as the proposed action because under this alternative, the proposed linear facilities would still cross

the OHV open route. Impacts related to construction, operation and maintenance, and closure and decommissioning of this alternative would be similar to the proposed action.

#### Transportation

Since implementation of the Dry Cooling Alternative does not significantly affect the number of workers needed for construction and operation, impacts would be similar to the proposed action.

### *No Action Alternative A and No Project Alternative B*

#### Public Access

Generally, for the No Action Alternative A and No Project Alternative B, there would be no direct or indirect impacts to OHV routes and values.

#### Transportation

If No Action Alternative A or No Project Alternative B were selected, none of the anticipated transportation-related impacts of the proposed action would occur. Instead, the land on which the GSEP is proposed would become available to other uses consistent with CDCA Plan use opportunities, potentially including another renewable energy project. Thus, impacts of these alternatives on transportation could be substantially similar to the proposed action.

### *No Project Alternative C*

#### Public Access

For the No Project Alternative C, where the ROW for the proposed action would not be granted but the CDCA would be amended to find the proposed action area suitable for any type of solar energy development, impacts to OHV open route and associated affects could be similar to the proposed action; however, dependent on the technology and site layout, impacts to OHV designated routes could be avoided or minimized.

#### Transportation

For the No Project Alternative C, where the ROW for the proposed action would not be granted but the CDCA Plan would be amended to find the proposed action area suitable for any type of solar energy development, impacts to transportation could be similar to the proposed action.

## 4.16.3 Discussion of Cumulative Impacts

### Public Access

In addition to the proposed GSEP, there are many past, present, or reasonably foreseeable future actions that contribute to impacts on OHV use. During the CDCA and NECO planning process, a detailed inventory and designation of routes was developed. This route designation system, along with other land management actions such as ACECs and the designation of national parks and wilderness, has resulted in significant changes to OHV recreation opportunities in eastern Riverside County. Since the passage of FLPMA in 1976, the changes or reduction to OHV

opportunities in Riverside County likely improved the recreational experience for some users who preferred remote camping and hiking and decreased the recreational experience for some users who prefer open OHV use areas rather than designated routes. Numerous energy-related development projects, including the proposed action, would result in the closure of some OHV open routes that may result in some users seeking out, legally or illegally, other areas of the desert for their activities and experiences. Therefore, the combined effect of the overall cumulative past, present, and proposed and reasonably foreseeable projects in eastern Riverside County could adversely affect OHV opportunities through closures, rerouting, and use restrictions.

## Transportation

### *Construction*

A number of solar projects are projected to be built within approximately 100 miles of the I-10 corridor (Desert Center to Blythe). The Palen, Blythe and Desert Sunlight projects currently are proposed to be constructed on BLM land and currently are under review by BLM. These projects, as well as other projects in the vicinity of the GSEP, could affect the I-10 corridor between Desert Center and Blythe due to construction traffic.

Construction of the GSEP is scheduled to overlap with the construction schedules of three other projects in the area, two solar energy generation parabolic trough projects, the Palen Solar Power Project and Genesis Solar Energy Project as well as the Desert Sunlight Photovoltaic Project. These three projects plus the GSEP would result in approximately 3,623 workers travelling on I-10 to their work sites at the same time. The overlapping construction schedules of these projects would result in cumulatively considerable impacts to I-10 as well as to local streets, highways, and intersections in the vicinity of the GSEP site.

### *Operations*

Truck travel as well as other non-employee site visits would be very small and typically would occur during non-peak periods. Consequently, cumulative operational impacts would not be significant and would not require mitigation.

# 4.16.4 Summary of Mitigation Measures

## Public Access

BLM-OHV-1: No less than 60 days prior to construction, the Applicant shall coordinate with the authorized officer administering any NECO Plan-designated open routes to establish temporary closure of the route to avoid construction area hazards, if the route is deemed unsafe to use during construction. The Applicant shall post a public notice of the temporary route closure and penalties for any off route OHV activities. The Applicant shall document its coordination efforts with the authorized officer and submit this documentation to the BLM and other agencies affected at least 30 days prior to construction.

### Transportation

The mitigation measures imposed by the Energy Commission as Conditions of Certification for the GSEP would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G. The following mitigation measures would avoid or minimize impacts on Transportation:

TRANS-1, TRANS-2, TRANS-3, TRANS-4, TRANS-5

## 4.16.5 Residual Impacts after Mitigation Measures were Implemented

### Public Access

OHV users would be displaced and could illegally substitute other natural, undisturbed desert areas for their riding experiences and benefits causing impacts to sensitive desert resources including biological and/or cultural resources.

### Transportation

LOS within the vicinity of the GSEP would be at LOS C, greater than existing LOS A.

## 4.16.6 Unavoidable Adverse Impacts

### Public Access

Reflected sun from the solar troughs would produce glint and glare that could distract OHV users in the surrounding areas.

### Transportation

There would be no unavoidable adverse impacts related to transportation.

# 4.17 Impacts on Vegetation Resources

## 4.17.1 Impact Assessment Methodology

This analysis is based, in part, upon information from the following sources: the Application for Certification (AFC) (GSEP 2009a); Data Adequacy Supplement (GSEP 2009c) and Data Adequacy Supplement 1A (GSEP 2009d); responses to CEC staff data requests (GSEP 2009f, TTEC 2010f); CEC staff workshops held on November 23 and 24, December 18 and 31, 2009 and January 6, 11, and 12, February 10 and 18, 2010, April 19, 20, and 21 and May 5, 2010; site visits by CEC staff on October 27, 2009, December 10, 2009, January 12 and February 25, 2010; the Applicant's December 2009 Notification of a Lake or Streambed Alteration (TTEC 2009d); revisions to the Notification of a Lake or Streambed Alteration (TTEC 2010j, TTEC 2010l); the Applicant's Aeolian Transport Evaluation and Ancient Shoreline Delineation Report for the GSEP (Worley Parsons 2010c); the applicant's Interim Preliminary Aeolian Sand Source, Migration and Deposition Letter Report for GSEP (Worley Parsons 2010d); PWA's Geomorphic Assessment of the Genesis Solar Project Site (CEC Revised Staff Assessment Soil and Water Appendix A; PWA 2010a); the Applicant's Incidental Take of Threatened and Endangered Species Permit Application (TTEC 2009c); the Applicant's draft mitigation plans including the Draft Desert Tortoise Relocation/Translocation Plan (TTEC 2010a), Draft Weed Management Plan (TTEC 2010g), Draft Revegetation Plan (TTEC 2010i), and Draft Common Raven Monitoring, Control and Management Plan (TTEC 2010k); preliminary 2010 survey data (TTEC 2010m) and other supplemental information (TTEC 2010r as cited in the CEC RSA June 2010, TTEC 2010p); information about minor changes to the GSEP (TTEC 2010o); communications with representatives from the California Department of Fish and Game (CDFG), Bureau of Land Management (BLM), and the U.S. Fish and Wildlife Service (USFWS); and information contained within the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO). Information used to update this FEIS section is found in an updated Biological Resources Technical Report that includes findings from spring, 2010, surveys (TTEC 2010p) and the Revised Staff Assessment Supplement from the CEC.

## 4.17.2 Discussion of Direct and Indirect Impacts

### Proposed Action

Direct impacts are those resulting from a proposed action and occur at the same time and place. Indirect impacts are caused by the action, but are later in time or farther removed in distance while still reasonably foreseeable 40 CFR 1508.8. The potential impacts discussed in this analysis are those most likely to be associated with construction and operation of the proposed action.

Impact analyses typically characterize effects to plant communities as temporary or permanent, with a permanent impact referring to areas that are paved or otherwise precluded from restoration to a pre-project state. In the desert ecosystems the definition of permanent impacts needs to reflect the slow recovery rates of its plant communities. Natural recovery rates from disturbance in these systems depend on the nature and severity of the impact. For example, creosote bushes

can resprout a full canopy within five years after damage from heavy vehicle traffic (Gibson et al. 2004), but more severe damage involving vegetation removal and soil disturbance can take from 50 to 300 years for partial recovery; complete ecosystem recovery may require over 3,000 years (Lovich and Bainbridge 1999). In this analysis, an impact is considered temporary only when there is evidence to indicate that pre-disturbance levels of biomass, cover, density, community structure, and soil characteristics could be achieved within five years.

### *Sonoran Creosote Bush Scrub*

Direct impacts include permanent loss of acreage; fragmentation of adjacent wildlife habitat and native plant communities. Indirect impacts include disturbance (noise, lights, dust) to surrounding plant and animal communities; spread of non-native invasive weeds; changes in drainage patterns downslope of the GSEP; erosion and sedimentation of disturbed soils.

### *Ephemeral Drainages (including Waters of the State)*

Direct impacts include loss of hydrological, geomorphic, and biological functions and values of Desert Dry Wash Woodland (microphyll woodland). Indirect impacts include permanent loss of hydrological connectivity downstream of the GSEP, including unvegetated ephemeral washes; head-cutting on drainages upslope; and erosion and sedimentation downslope. Table 4.17-1 summarizes the direct and indirect impacts to ephemeral drainages as a result of GSEP construction.

Grading within the GSEP Disturbance Area and its ephemeral drainages would directly impact and permanently eliminate ephemeral drainages and their hydrological, biogeochemical, vegetation, and wildlife functions. Drainages would be temporarily impacted by construction of linear facilities and access roads associated with those facilities.

Desert washes downstream from the GSEP area would also be indirectly impacted as a result of changes to upstream hydrology, with downstream vegetation in washes deprived of flows or receiving lower or higher volumes and velocities of water than current conditions at discharge points along the stormwater conveyance channel. Diversions could substantially alter the hydrology and wash-dependent vegetation of any features that may occur downstream of the GSEP area, an effect that is quite apparent below Interstate 10 (I-10) near the Corn Springs Exit. On the northern side of I-10 broad expanses of desert wash trees and shrubs have died in response to the construction of I-10 and the diversion of smaller channels into collector ditches on the southern side of I-10.

The Applicant has provided drainage plans that conceptually discuss how diffusers at the downstream end of the engineered channels would restore sheet flow downslope of the GSEP disturbance area. However, as discussed in Section 4.19 (Water Resources), the drainage report does not provide sufficient information to establish the post-GSEP flooding conditions or to determine the potential impacts to vegetation downstream. Other potential indirect effects of the changed proposed drainage plans are erosion and resulting root exposure leading to the eventual death of vegetation. Washes upstream of the GSEP area may also be impacted by head-cutting and erosion; however, bank stabilization measures are proposed for the intake portion of the

**TABLE 4.17-1**
**ACREAGE OF DIRECT AND INDIRECT IMPACTS TO VEGETATION RESOURCES BY ALTERNATIVE**

| Resource | Proposed Action (acres) | Dry Cooling (acres) | Reduced Acreage (acres) | No Action/No Project A, B, C (acres) |
|---|---|---|---|---|
| Sonoran Creosote Bush Scrub | 1,773 | 1,773 | 1,039 | 0 |
| Stabilized/Partially Stabilized Sand Dunes – Direct Impacts | | | | |
| Direct Impacts[c,g] | 7.5 | 7.5 | 7.5 | **0** |
| Playa and Sand Drifts Over Playa | | | | |
| Direct Impacts[c,g] | 38 | 38 | 44 | 0 |
| Indirect Impacts [d,h] | 151 | 151 | 76 | 0 |
| ***Total Dune types*** | ***196.5*** | ***196.5*** | ***127.5*** | ***0*** |
| Ephemeral Drainages (State Waters* - - Direct Impacts[e]) | | | | |
| Desert Dry Wash Woodland (Microphyllous Riparian Vegetation ) | 16 | 16 | 16 | 0 |
| Unvegetated Ephemeral Dry Wash | 53 | 53 | 51 | 0 |
| Ephemeral Drainages (State Waters- -Indirect Impacts[f]) | | | | |
| Unvegetated Ephemeral Dry Wash | 21 | 21 | 21 | 0 |
| Total State Waters | 90 | 90 | 88 | 0 |

a From Application for Incidental Take Permit (TTEC 2009c).
b From CEC 2010d (TetraTech table "Anticipated Direct and Indirect Impacts to Vegetation Communities"); includes impacts to Sonoran creosote bush scrub.
c From CEC 2010d; includes direct permanent impacts to stabilized and partially stabilized sand dunes and sand drifts over playas.
d From CEC Genesis Revised Staff Assessment Soil & Water Appendix A, calculation of the downwind impacts to Mojave fringe-toed lizard habitat from Project intrusion into sand transport corridors.
e From TTEC 2010l (TetraTech memo "Revisions to Jurisdictional Waters for the Genesis Solar Energy Project").
f From Appendix D, Lake and Streambed Alteration Agreement Application (TTEC 2009d).
g From TTEC 2010o (Tetra Tech memo "Minor Changes to the Genesis Solar Energy Project Description: 6-pole Extension of Transmission Line; Inclusion of Distribution and Telecommunications Line; Removal of "Toe" Area from Plant Facility").
h PWA 2010a. (tn pending) PWA memo "Genesis Solar Energy Project, Analysis of Impacts to Sand Transport Corridor")...
* Reflects changes Also, the removal of the 'toe' from the plant site footprint would also reduce impact acreage to state waters; however these reduced impact calculation have not been provided to date and therefore, are not included in this table.
i Revised per TTEC 2010s (Supplemental Information Genesis Solar Energy Project June 18, 2010) to include 6.5 acres of impact to sand dunes from the six-pole extension of the gen-tie line north of the Colorado River Substation. Acreage of 3.2 acres of impact from construction of distribution/telecommunications line is not yet included here or in the Sonoran creosote scrub, pending clarification regarding the upland habitat types that will be impacted by the distribution/telecommunications line.
j Revised per TTEC 2010s (Supplemental Information Genesis Solar Energy Project June 18, 2010) to reduce the impact to state waters by 21 acres, reflecting elimination of the 41.4 acre "toe" at the easternmost solar field.
k Includes one additional acre of direct impact (rounded up from 0.84 acre) due to construction of the distribution/telecommunications line.

channel that would minimize or avoid this potential effect. All of the ephemeral washes occurring downstream of the GSEP boundaries would be affected, possibly adversely, by the proposed GSEP.

Direct and indirect impacts of the GSEP on ephemeral drainages would be substantial. The extensive ephemeral drainage network at the GSEP site currently provides many functions and values, including landscape hydrologic connections; stream energy dissipation during high-water flows that reduces erosion and improves water supply and water-quality filtering functions, surface and subsurface water storage, groundwater recharge, sediment transport and storage, and deposition aiding in floodplain maintenance and development, nutrient cycling, and wildlife

habitat and movement/migration; and support for vegetation communities that help stabilize stream banks and provide wildlife habitat. The GSEP would eliminate all of these functions and values on ephemeral washes, and would temporarily impact these functions in additional areas.

To replace the flood conveyance function and some of the biogeochemical functions of the impacted desert washes, the Applicant has proposed to replicate the existing flow patterns and volume with three channels that would be constructed adjacent to, through, or across the site. Channel design, in particular the proposed plans for restoring sheet flow to the terrain downslope of the GSEP boundaries, has yet to be finalized.

The engineered channels would not replace the biological resource values and functions of the GSEP's ephemeral washes.

#### Stabilized/Partially Stabilized Sand Dunes and Playa and Sand Drifts Over Playa

Linear features such as powerlines and access roads would disturb the sand dune vegetation community. Disturbed acreage would be subject to additional weed establishment and possibility of wildfire affecting native vegetation. Weeds and/or fire may spread from the direct impact of the linear features of the GSEP.

### *Groundwater Dependent Vegetation Communities*

The proposed GSEP's groundwater pumping would have an impact on groundwater levels within the zone of potential effect centered on the GSEP's pumping well. Considerable uncertainty remains as to the potential extent of the GSEP's impacts to groundwater and the potential adverse effects to groundwater dependent sensitive plant communities and to wildlife.

#### Groundwater-Dependent Vegetation During Construction and Operation

GSEP pumping during construction and operation could lower groundwater levels (Water Resources, Section 4.19), which could have a substantial impact once it lowers the water table below the reach of the deep-rooted, groundwater-dependent plants (phreatophytes) that are within the GSEP pumping impact zone. This zone includes an area extending 2 to 3 miles from the GSEP pumping well during construction and approximately 10 miles by the end of GSEP operation (Worley Parsons 2009, Figure 3).

The Applicant predicts that the maximum drawdown in the shallow water table (the water table that supports phreatophytes) associated with the GSEP is approximately 0.3 feet in the area of the pumping well. The area where drawdown exceeds 0.25 foot is limited to within approximately 2.5 to 3.5 miles of the GSEP wells (see Figure 4.19-1). The Applicant's analysis shows a minor drawdown in the deep water aquifer of 0.5 foot as much as 10 miles away at the end of GSEP operation (33 years); drawdown in the shallow aquifer would be considerably less (Worley Parsons 2009, Figure 3). See Section 3.18, Vegetation Resources, for discussion of the shallow and deep aquifers.

The proposed groundwater pumping is not expected to substantially affect the health or status of the creosote bush scrub, which dominates the drier portions of the valley floor and surrounding

alluvial fans and pediments, because this plant community is hundreds of feet above the groundwater level. These drought-adapted and shallow-rooted species are supported by precipitation, not shallow or deep groundwater. The phreatophytic communities potentially affected by the proposed GSEP are described below.

### Groundwater-Dependent Plants and Communities in the GSEP Pumping Zone

Phreatophytes are groundwater-dependent plants with deep root systems that can extend tens of feet below the ground surface to the underlying water table. The communities of desert phreatophytes found in the 10 mile radius around the GSEP pumping well include mesquite bosques, bush seep-weed-dominant chenopod scrubs (succulent chenopod scrubs), and ironwood and palo verde woodlands (microphyll woodlands). The dune scrubs occurring in areas of near-surface groundwater may also be affected by lowered groundwater tables. All of these communities are designated as rare natural communities by the CNDDB (CDFG 2003); and the Desert Dry Wash Woodland (a microphyll woodland), chenopod scrubs, and dune habitats are recognized sensitive plant communities in the BLM NECO Plan (BLM CDD 2002).

Ground waters are important to sustain vegetation for wildlife habitat in some areas where surface waters are not present (RWQCB 2006). Special-status wildlife has been documented within these phreatophytic communities in the GSEP area and around Palen Dry Lake including Mojave fringe-toed lizard, American badger, western burrowing owl, desert kit fox, and loggerhead shrike (GSEP 2009a; Solar Millennium 2009a). Two special-status plants, jack-ass clover and Palmer's jack-ass clover, occur among the mesquite dunes around Palen Dry Lake and are known from only a few occurrences in California (CNDDB 2010; Silverman pers. comm.). Numerous rare plants were observed in the playa dunes and drifts at the southern tip of the lake (AECOM 2010d), including a new species of saltbush (*Atriplex* sp. nov. J. Andre).

The Applicant based its assumptions that no phreatophytes would be affected on the results of a reconnaissance-level assessment of the large stand of mesquite bosque at the northeast end of Palen Lake (TTEC 2009d). However, CEC staff found documentation of smaller stands of mesquite bosque at the southwest end of the lake (Evans & Hartman 2007) and observed the mesquite stands on recent aerial photos. Additionally, phreatophytic plant communities dominated or co-dominated by bush seep-weed (a phreatophyte) are found south of Palen Lake and sporadically along the southwest margins of Ford Dry Lake (AECOM 2010a) within the end-of-operation GSEP pumping zone, a 10-mile radius around the GSEP well. The effects of the proposed GSEP pumping well (AECOM 2010a) would be greater and be felt as much as a decade sooner than the end-of-operation effects of the GSEP.

Closer to the GSEP around Ford Dry Lake, the Applicant noted communities co-dominated by bush seep-weed and allscale (a xerophyte), with scattered woody phreatophytes such as blue palo verde and ironwood (TTEC 2009d). It is uncertain whether the phreatophytes around Ford Dry Lake are supported by the basin aquifer (from which the GSEP would draw its water) or mountain front aquifer, which the Applicant has stated would be essentially unaffected by pumping from the deeper—and at least partially contained—basin aquifer. Shallow water tables at Ford Dry Lake were measured at 80 feet in depth in the test well on site. Almost 10 miles away

at Palen Dry Lake, the groundwater is considerably shallower, particularly at the northeast end of the lake. At the old growth ironwood forest in Palen Wash, approximately 5 miles north of the GSEP site, the predicted water table drawdowns are in the range of 0.05 to 0.2 feet (see Figure 4.19-1).

Groundwater can also be held near the ground surface in dune systems through capillarity and can influence both the vegetative cover and the morphology of the dunes. Recent research in New Mexico has confirmed that groundwater is one feature that influences dune morphology; dune fields are shaped by feedback between aeolian dynamics and groundwater chemistry (Langford et al. 2009). Consequently, some dune shrubs, when present in the dunes off the northeast corner of the GSEP project where the groundwater is much nearer to surface than at Ford Dry Lake, could also be affected by a drop in groundwater levels when the levels drop below the effective rooting depth of these shallower rooted species.

Preliminary investigations conducted at the GSEP site suggest that the aquifer that is proposed for development is under confined to semi-confined conditions and is separated in part from the shallow alluvial groundwater system by low permeability sediments (Worley Parsons 2009). Correspondingly, the Applicant's assessment of impacts to these layers is based on the assumption that the confining layers are laterally continuous and maintain hydraulic separation away from the proposed pumping wells. There is concern about the level of uncertainty in such a prediction and the potential influence of groundwater pumping in the shallow aquifer when the low permeability layers are fractured, as they often are (Deacon et al. 2007).

#### Groundwater-Dependent Plant Responses to Lowered Groundwater Levels

A plant affected by competition for water displays signs of stress (e.g., Manning and Barbour 1988), and stress can be manifested as anything from diminished physiological processes to plant death. Shallower rooted herbs are the first affected and least able to withstand drought-stress; deep-rooted woody phreatophytes (such as mesquite) can take decades to die. Stress to woody species, such as mesquite, from declines in groundwater levels would be detected in measures of plant vigor, such as die-back, long before plant cover changes might be measurable in an aerial photo. As Elmore et al. (2006) and Manning (2007) show, total live plant abundance (plant cover) on a site decreases as the water table is lowered. This in turn increases wind and water erosion of soil, and the void left behind by the receding native plants is often colonized by invasive exotic plants (Patten et al 2007; Lovich 1999; Manning 2006). Lowering the local water table from groundwater pumping has also been demonstrated to induce habitat conversions (Manning 2006; 2007). Even modest drawdowns of 0.3 feet can adversely affect vegetation when groundwater drops below the effective rooting level; when the drop is sustained (so that plants never have an opportunity to recover); or when the groundwater lowering occurs not just in summer (when plants are dormant) but also occurs throughout early spring when plants need and utilize water most (Manning pers. comm.).

Increased soil erosion induced by the decreasing vegetative cover leads to a loss of nutrients, minerals, and the structure necessary for seed germination of plants that are adapted to prior groundwater conditions on the site. Non-native opportunistic "weed" species (e.g., Russian

thistle) are better adapted to nutrient-poor soils and a wider variety of soil moisture regimes or conditions, and demonstrate a competitive edge. Animals, including mammals, reptiles, birds, and invertebrates, that may require certain plant species or a certain vegetation structure, may no longer find suitable food or living space. Local extirpations are compounded when the displaced animal is an important food source for another animal. The complex below-ground systems of bacteria, algae, and fungi, which provide many valuable ecosystem services (e.g. breakdown of organic matter, nitrogen fixation, carbon storage, and recycling of nutrients), are also disrupted when water tables are lowered. Ultimately, when groundwater levels are lowered beyond the normal reach of groundwater-dependent ecosystems, the decline in plant cover and change in species abundance can result in severe consequences, depending on the organism(s) involved or the prevailing ecosystem processes.

#### Importance of Spring Water Table in Maintaining Groundwater Dependent Plant Communities

The Applicant states that water table drawdowns of 0.3 feet or less are similar to or less than expected normal climatic, seasonal, or diurnal water table fluctuations (Worley Parsons 2009). However, inter-annual measurements or averages of water table fluctuations are misleading in predicting the effects of water level declines to groundwater-dependent plant communities, and do not take into account the ecological and physiological traits of arid region plant communities. In forecasting a plant community's response to lowering groundwater tables, it is necessary to identify the quantity and timing of water availability necessary for healthy ecologic functioning (Eamus and Froend 2006). The extent to which water tables drop during the summer and fall dormant seasons is irrelevant for such forecasts; the only relevant measure of a plant community's ability to withstand water table declines is the annual water table year-to-year fluctuations in early spring because the growing season is when plants need and utilize water most. In arid regions, most plants are dormant in summer and fall, and measures of fluctuating groundwater levels made during this time will not provide information about the ability of groundwater dependent plant communities to withstand reduced water tables. When, for example, water tables in April are reduced to the low levels associated with summer and fall (as a result of groundwater pumping), then adverse consequences would be expected (Manning pers. comm.). Groundwater dependent ecosystems experience measurable plant losses and other adverse changes when water tables fail to fill.

### *Sand Transport Corridor*

The GSEP's western solar array is located on land surface units that are relatively geomorphically stable and are not within an active wind transport corridor. As originally configured, the eastern solar array of the GSEP intruded into the outer edges of the Palen-McCoy Valley Sand Transport Corridor, which delivers sand to Mojave fringe-toed lizard habitat downwind. The Applicant estimated that the easternmost end of the GSEP's eastern solar array extended approximately 1000 feet (19 percent) of the width of this corridor (Worley Parsons 2010c). The Applicant recently revised their GSEP footprint (TTEC 2010o) to eliminate 41.4 acres of the easternmost array, thus avoiding intrusion into the Palen-McCoy Valley Sand Transport Corridor.

The southwestern corner of the eastern solar array extends into another sand transport corridor, the PDL-Chuckwalla Valley Sand Transport Corridor, which moves sand from northeast to southwest. The intrusion extends into the corridor by approximately 1,600 feet at a point where the corridor is 24,000 feet wide, approximately 7 percent of the width of the corridor (Worley Parsons, 2010c).

GSEP intrusion within the PDL-Chuckwalla Valley Sand Transport Corridor would not result in a substantial reduction in sand transport capacity. However, the presence of the southwestern corner of the eastern solar array would diminish the input of sand to downwind areas, with adverse effects to the active sand layer that is crucial to Mojave fringe-toed lizard habitat. An area of vegetated sand dune habitat downwind of the intrusion within the PDL-Chuckwalla Valley Sand Transport Corridor would be adversely affected by interference with this sand transport corridor (PWA 2010a). This downwind area would receive reduced sand input because of interference from GSEP features, deflating downwind sand dunes and gradually diminishing their depth and extent over time as sand output exceeds sand input.

Habitat suitability for Mojave fringe-toed lizards would be gradually degraded as wind-borne sand is depleted and not replaced within these downwind areas. GSEP impacts to Mojave fringe-toed lizard as a result of these indirect habitat impacts are discussed below in the subsection on Special-Status Species: Impacts.

The GSEP would also have an indirect impact on the creation and maintenance of sand transport as a result of rerouting of the ephemeral drainages in the GSEP area. More than a hundred ephemeral washes cross the site from north to south. The boundaries of these shallow channels are typically subtle, and the presence of these channels in areas of desert varnish and soil horizons suggests that these channels are relatively stable (i.e., do not cut and fill vertically). The channels in the western portion of the GSEP area do not appear to transport much sediment, as evidenced by their shallow depth and the absence of scour features. However, larger washes at the eastern side of the GSEP area have braided channels that show more evidence of active sediment transport, with better-defined banks and some sand in the channel bottoms. Unlike the small washes that cross the western solar array site, the larger washes appear to supply a large amount of sand to the surrounding area. The Applicant has not provided a quantitative or qualitative assessment of the changes in fluvial sand transport as a result of re-routing the ephemeral drainages in the GSEP area, but the GSEP could result in a reduction in the water-borne sand available for transportation to downwind sand dune systems.

The GSEP linear facilities would pass through the core of the Palen-McCoy Valley Sand Transport Corridor, where considerable sand transport occurs (Worley Parsons 2010c). The GSEP should be able to avoid or minimize impacts created by the linear facilities within this zone; most wind-borne transport of sand occurs within three feet of the ground, so the buried gas pipeline and at-grade access roads would be flush with the surrounding ground surface and would not create ground level obstructions. Transmission line supports should not pose a problem due to their small surface area at ground level.

### *Invasive and Noxious Weeds*

Construction activities and soil disturbance could introduce new noxious weeds to lands adjacent to the GSEP plant site and its linear facilities, and could further spread weeds already present in the GSEP vicinity. The spread of invasive plants is a major threat to vegetation resources in the Colorado Desert because non-native plants can displace native plants, increase the threat of wildfire, and supplant wildlife foods that are important to herbivorous species. Vehicles are the primary conduit for the spread of many invasive weeds, including Sahara mustard (*Brassica tournefortii*). It is also spread along transmission corridors, due to a combination of soil disturbance during construction, road construction and maintenance, and increased vehicle use in previously inaccessible areas. The Secondary Access Road, Distribution-Telecommunication Line, Redundant Telecommunications Line, and 6-pole transmission line extension could cause similar impacts as the other linear facilities mentioned above, although these features would occur along other linear disturbances or would add very few acres of impact.

Sahara mustard is regarded as one of the most invasive wildland pest plants in the Colorado and Mojave deserts, one of the most common invasive plants in desert tortoise habitat, and capable of dominating entire desert landscapes when no control actions are taken. Left uncontrolled, it out-competes and ultimately replaces native wildflowers that provide valuable forage for the desert tortoise. It forms dense thickets that can increase the frequency, intensity, and size of desert fires, increasing the threat to native plant communities, the desert tortoise, and other wildlife (Brooks 2010 as cited in the CEC RSA June 2010). In areas where Sahara mustard is particularly dense it may also impede desert tortoise movement (Berry pers. comm.). In the Colorado and Mojave Deserts, a single tortoise was necropsied that had died from renal failure, related to renal oxalosis, and the crystals present in the kidneys were identified as oxalates (Jacobson et al. 2009 as cited in the CEC RSA June 2010). One additional tortoise was later necropsied that died of oxalosis in the same region (Berry pers comm. 2010 as cited in the CEC RSA June 2010). Although many native plants in the Mojave and Colorado deserts contain oxalates, the oxalate-containing weed Sahara mustard is one of the most common invasives in desert tortoise habitat and is a suspected cause of the renal failure (Berry pers comm. as cited in the CEC RSA June 2010).

Salt cedar, Russian thistle, Sahara mustard, and Mediterranean grass are already present in the GSEP vicinity and are expected to increase as a result of construction- and operation-related disturbance. The proliferation of these and other non-native species has dramatically increased the fuel load and frequency of fire in many desert ecosystems (Lovich & Bainbridge 1999). Unlike other ecosystems in California, fire was not an important part of the Colorado Desert ecosystems and most perennials are poorly adapted to even low-intensity fires, and the animals that coevolved are not likely to respond favorably to fire either (see Fire Ecology section). The potential spread or proliferation of non-native annual grasses, combined with the proximity to ignition sources could potentially increase the risk of fire; the effects to these poorly-adapted desert communities would be harmful, particularly to cacti and most native shrubs species. Burned creosote bush and other native shrubs are typically replaced by short-lived perennials and non-native grasses (Brown & Minnich 1986).

### *Dust on Plants*

Disturbance of the soil's surface caused by construction traffic and other activities would result in increased wind erosion of the soil. Aeolian transport of dust and sand can result in the degradation of soil and vegetation over a widening area (Okin et al. 2001). Dust can have deleterious physiological effects on plants and may affect their productivity and nutritional qualities. The destruction of plants and soil crusts by windblown sand and dust exacerbates the erosion of the soil and accelerates the loss of nutrients (Okin et al. 2001).

### *Cacti, Yucca, and Native Trees*

The two cacti species (beavertail cholla and Wiggins cholla) and three tree species (palo verde, cat-claw acacia, and ironwood) that occur within the GSEP area as well as the other cacti and native trees identified during field surveys, including buckhorn cholla, silver cholla, pencil cholla, ocotillo, fish-hook cactus, honey mesquite, and smoke tree (GSEP 2009a, Appendix C Biological Resources Technical Report), would to the extent practical, be salvaged by the Applicant during construction of the GSEP, and the salvaged plants would be used for revegetation of temporarily disturbed areas. The Applicant has prepared a draft Revegetation Plan that addresses the salvaging of cacti and native trees during initial vegetation grubbing of the GSEP site, as well as proper storage and treatment of salvaged plant material and seed collection, replanting of salvaged materials, and monitoring parameters including revegetation success criteria and performance standards for salvaged materials (TTEC 2010i).

### *Special Status Plants*

The GSEP's direct and indirect impacts to Harwood's eriastrum and Harwood's milk-vetch are substantial, but impacts to ribbed cryptantha are not. While the direct effects of the GSEP on desert unicorn are minor, the impacts of all future projects in the NECO planning area are cumulatively considerable.

GSEP construction and operation could result in direct and indirect impacts to late season special-status plants, when present, and impacts to these and other species may be substantial.

Direct impacts include potential impacts to BLM Sensitive Harwood's eriastrum (CNPS 1B) from gen-tie construction near the substation; Harwood's milk-vetch (CNPS 2) on linear features and solar plant site; desert unicorn plant (CNPS 4) on the solar plant site; ribbed cryptantha (CNPS 4) on linear features and the solar plant site. Potential direct impacts to CNPS 1B, 2, 4 and any new taxa detected during late season surveys. These same species would also receive impacts from the Secondary Access Road, Distribution-Telecommunication Line, Redundant Telecommunications Line, and 6-pole transmission line extension could cause similar impacts as the other linear features mentioned above, although these features would occur along other linear disturbances or would add very few acres of impact.

Indirect impacts include fragmentation/isolation and reduced gene flow between isolated populations; introduction and spread of invasive plants; erosion and sedimentation of disturbed soils; potential disruption of sand transport systems that maintain habitat below the GSEP;

alteration of drainage patterns; herbicide drift; and disruption of photosynthesis and other metabolic processes from dust. Construction of the SCE substation could cause loss of over 1000 individuals of Harwood's eriastrum.

Spring 2009 and 2010 surveys of the GSEP transmission gen-tie line and the proposed SCE Colorado River Substation (AECOM 2010d) indicate that construction of the GSEP would directly impact four special-status plant species:

1. Harwood's eriastrum (also sometimes referred to as Harwood's phlox), (*Eriastrum harwoodii*), a BLM Sensitive species, CNPS List 1B (rare, threatened, or endangered throughout its range);

2. Harwood's milk-vetch (*Astragalus insularis* var. *harwoodii*), a CNPS List 2 (rare, threatened, or endangered in California but more common elsewhere);

3. Desert unicorn plant (*Proboscidea althaeifolia*), a CNPS List 4 (limited distribution; a 'watch list'), and

4. Ribbed cryptantha (*Cryptantha costata*), also a CNPS List 4.

The spring surveys also detected a single plant of Las Animas colubrina, a CNPS List 2; however, it occurs approximately one mile north (upstream) of the GSEP site and no substantial direct or indirect effects are expected. The GSEP's direct and indirect impacts to two special-status species—Harwood's eriastrum (a BLM Sensitive species) and Harwood's milk-vetch—are substantial. Although the impacts of all present and reasonable foreseeable future projects in the NECO planning area (see Appendix E), and projects throughout their range in California, to both plants and the desert washes that support them, are cumulatively considerable. Impacts to ribbed cryptantha are less-than-substantial because many occurrences representing tens of thousands of ribbed cryptantha have been documented during the spring surveys of three projects in the vicinity. Although the direct effects of the GSEP on desert unicorn plant are minor, the impacts of all present and reasonable foreseeable future projects in the NECO planning area (see Appendix E) on individual plants or on the sandy washes that support the species are cumulatively considerable.

Based on consultation with recognized experts in the flora of the California Desert region (J. Andre, T. LaDoux as cited in the CEC RSA June 2010, D. Silverman, A. Sanders, pers. comm. as cited in the CEC RSA June 2010), potentially substantial impacts to special-status plants could be missed unless additional late season surveys are conducted. Late-season plants regarded as having a moderate to high potential for occurrence in the GSEP area (including the proposed Colorado River Substation site) include the three species listed below; however, the under-surveyed and poorly-understood nature of the region suggests that unanticipated finds are also likely (Andre pers. comm.), including Arizona species not currently known to occur in California (Silverman pers. comm.):

1. Abram's spurge (*Chamaesyce abramsiana*) – CNPS List 2.1, NatureServe rank G4/S1.2;

2. Flat-seeded spurge (*Chamaesyce platysperma*) – BLM Sensitive, CNPS 1B.2, NatureServe rank G5/S1.2; and

3. Lobed ground cherry (*Physalis lobata*) – CNPS List 2.3, NatureServe rank G5/S1.3.

Several additional late-season species were identified with potential to occur; however, their blooming seasons overlap the spring survey window and it is expected that they could have been detected during a spring survey, if present. Nevertheless, summer-fall survey crews should be trained to recognize the following additional species: glandular ditaxis; California ditaxis; jack-ass clover, and Palmer's jack-ass clover (a proposed addition to the CNPS Inventory and known to occur at Palen Dry Lake in marginal dune habitats). Descriptions of these additional species are provided in the subsection C.2.4.1 of this section. Desert unicorn plant is typically easier to detect during late season surveys and impacts to this species are addressed below under the discussion of the spring survey results.

### Assessment Methodology and Analytical Tools

In addition to state and federal-listed plant species, and BLM sensitive species, special-status plants also include CNPS List 1B, 2, 3 and 4 plants, and a few currently unlisted plants that are proposed additions to the CNPS Inventory. Additionally, a potentially new un-described taxon of saltbush (*Atriplex*) was discovered on the marginal dunes of Palen and Ford Dry Lakes in spring 2010, underscoring the region's under-surveyed and poorly understood flora. CNPS List 3 plants (plants of questionable taxonomic status) may be analyzed under CEQA when sufficient information is available to assess potential impacts to such plants. CNPS List 3 and 4 may be considered regionally substantial when, for example, the occurrence is located at the periphery of the species' range, exhibits unusual morphology, or occurs in an unusual habitat/substrate.

Several recognized experts in the region's rare plant flora during the preparation of the data requests were consulted for analysis of impacts to special-status plants (J. Andre, T. LaDoux as cited in the CEC RSA June 2010, D. Silverman, A. Sanders, pers. comm. as cited in the CEC RSA June 2010). Other sources consulted include the CNDDB (CNDDB 2010), the CNPS online inventory (CNPS 2009) and the BLM Palm Springs occurrence records (unpublished). The Consortium of California Herbaria (CCH 2010) was reviewed to determine when there were additional documented occurrences that were not already included in CNDDB. To improve the analysis, CEC staff loaded the occurrence data into an ESRI GIS-based web application that allowed CEC staff to view all CNDDB and CCH occurrences overlain on various jurisdictional, biological, landform, utility, USGS topographic maps and aerial imagery. This allowed CEC staff to better understand a species' threats and management vulnerabilities relative to probable future renewable energy projects throughout their range, their distance and proximity to projects or features, their peripheral status, potential for fragmentation and other indirect effects from nearby development, ownership and management threats to remaining occurrences and to see the variety of habitats and landforms associated with a given species occurrence. The following is a list of datasets that were utilized in the analysis:

1. PLATTS Transmission Data: licensed 3-rd party commercial transmission data)

2. CA State County boundaries: http://atlas.ca.gov/download.html?sl=casil

3. CNDDB RareFind: http://www.dfg.ca.gov/biogeodata/cnddb/cnddb_info.asp

4. BLM Renewables Projects: BLM online solar and wind project data: http://www.blm.gov/ca/gis/

5. CA STATSGO Soils: NRCS soil mapping from http://SoilDataMart.nrcs.usda.gov/

6. CA Cities boundaries: Part of PLATTS Transmission Data delivery

7. CA State Parks boundaries: http://atlas.ca.gov/download.html?sl=casil

8. Federal Wilderness boundaries: http://www.blm.gov/ca/gis/

9. Federal Lands ownership boundaries: http://www.blm.gov/ca/gis/

10. CA GAP Vegetation: http://www.biogeog.ucsb.edu/projects/gap/gap_data_state.html

11. Landforms NECO: from BLM Palm Springs Office – no Metadata – based on CA GAP but improved by BLM for NECO area

12. Landforms MDEP: Mojave Desert Ecosystem project: http://www.mojavedata.gov/datasets.php?&qclass=geo

13. Aerial Imagery – ESRI Data from ArcGIS.com

14. USGS Topo – ESRI Data from ArcGIS.com

### Impacts to Special-Status Plants Found During Spring 2009 and 2010 Surveys

This section addresses the direct and indirect effects of the GSEP to plants found within the Project Disturbance Area and one-mile buffer during the spring 2009 or 2010 surveys. The spring 2009 surveys encompassed the entire Project Disturbance Area and the survey results are presented in the Biological Resources section of the AFC (GSEP 2009a). The tabular results and raw GPS data from the spring 2010 surveys of previously un-surveyed areas were submitted in May 2010 (TTEC 2010m) and are reflected in this analysis. The new areas surveyed during 2010 include the transmission line and surrounding buffer area, southward to the gen-tie location with the Blythe Energy Transmission Line Project and the SCE Colorado River Substation which was surveyed during 2010 for the Blythe Solar Power Project (AECOM 2010d). In addition to state- and federal-listed plant species, and BLM Sensitive species, special-status plants also include CNPS List 1B, 2, 3 and 4 plants, as well as unlisted plants with local or regional significance as defined in the 2009 CDFG protocols for botanical assessments (CDFG 2009).

#### Harwood's Eriastrum

Harwood's eriastrum, also sometimes referred to as Harwood's phlox or Harwood's woollystar, is a BLM Sensitive species, and CNPS List 1B.2 species, which indicates it is rare, threatened, or endangered throughout its range. It has a NatureServe (CNDDB) rank of 2, meaning it is an imperiled species. This spring annual is associated with sandy plains or dunes, but typically semi-

stabilized habitat (versus active dunes) (CNPS 2010). Its global distribution and range is restricted to 14 known locations in San Diego, Riverside, and San Bernardino counties, typically in dunes associated with the margins around dry lakes such as Dale, Cadiz, and Soda lakes. Recently, surveys conducted in spring of 2010 for the Blythe Solar Project located this plant primarily in the sandy areas south of I-10, where 2,134 plants were located and mapped (AECOM 2010d, TTEC 2010o). The majority of these plants occur at the proposed Colorado River Substation site; however, plants could also be directly and indirectly affected by construction of the GSEP's gen-tie line in the vicinity of the substation.

CEC staff reviewed the occurrence data in the Consortium of California Herbaria and detected 2 occurrences that were not in the CNDDB (CCH 2010). Both of these are historical records from 1939 and 1958. Of the total of 14 occurrences in California (12 CNDDB plus two additional historic records), 3 of these are protected under National Park Service or State Park ownership. A total of three records are historical records. Four of these occurrences have documented threats, including OHV and non-native plant impacts.

Temporary direct impacts from construction of the Gen-tie line or the substation extension are likely, permanent direct impacts are possible, and indirect effects are likely. Indirect GSEP effects to Harwood's eriastrum in the vicinity of the GSEP gen-tie line include the spread of the non-native Sahara mustard across its dune habitat, which also degrades the habitat by prematurely stabilizing dunes. Transmission line maintenance activities and an increase in OHV use from the construction of roads into previously inaccessible areas could also impact Harwood's eriastrum.

#### Harwood's Milk-Vetch

Harwood's milk-vetch is a CNPS 2.2 species, a rank that indicates it is fairly threatened in California but more common elsewhere. It is also a covered species under NECO. It is found in desert dunes and sandy or gravelly areas in portions of Imperial, Riverside, and San Diego counties (CNPS 2009). Herbarium collections for this species are from Ogilby Road in Imperial County and three locales west of Blythe, the Pinto Basin, and Chuckwalla Basin in Riverside County. Harwood's milk-vetch has also been reported from Baja California, Sonora Mexico, and portions of Yuma County, Arizona (Reiser 1994). There are several CNDDB records for this species within the GSEP area (CNDDB 2010) and a 10-mile radius of the GSEP area. There is a record in the Consortium of California Herbaria database from Wiley's Well Road between McCoy and Mule Mountains from 400 feet elevation (CCH 2010). The Harwood's milk-vetch populations in the southern deserts are presumed stable given limited disturbance to their desert habitats (Reiser 1994), but the recent push for renewable energy development threatens a large portion of its habitat in Chuckwalla Valley and the broader NECO planning area. What remains of the Chuckwalla population would be fragmented by the many future projects proposed and subject to the indirect effects of invasive pest plants, which quickly colonize.

CEC staff reviewed the occurrence data in the Consortium of California Herbaria and detected 3 occurrences that were not in the CNDDB. All three are historical occurrences. Of the total 46 occurrences in California (CNDDB plus the additional occurrences), 9 are protected under National Park Service or State Park ownership. A total of 11 records are historical records.

Sixteen of these occurrences have documented threats including development, OHV, agriculture, transmission lines, road maintenance, and trash dumping.

Spring 2010 surveys identified several hundred (700+) plants of Harwood's milk-vetch along the transmission line and buffer area (TTEC 2010m). In addition, several Harwood's milk-vetch occurrences of unknown size were identified in the vicinity of the proposed SCE Colorado River Substation, south of I-10 at the southeast end of Chuckwalla Valley. Spring 2009 surveys identified twelve plants of Harwood's milk-vetch within the GSEP Area, only two of which occurred within the plant site Disturbance Area, and 10 plants within linear Disturbance Area. Substantial indirect effects anticipated include alteration of the hydrology and sediment transport of the desert washes, as well as spread of Sahara mustard across its habitat, which also degrades its habitat by prematurely stabilizing dunes. Transmission line maintenance activities and an increase in OHV use from the construction of roads into previously inaccessible areas are also likely. Global warming is also anticipated to adversely affect this and other desert annuals by delaying the fall rains beyond the optimum germination temperatures for many desert annuals in the Sonoran Desert region. Although many new occurrences have been found around the Chuckwalla Valley and Palo Verde mesa, many are also impacted by renewable energy projects, which fragment the remaining habitat, disrupt gene flow, and render the remaining occurrences more vulnerable to future impacts. The direct and indirect impacts of the GSEP to Harwood's milk-vetch would be substantial.

### Desert Unicorn Plant

Desert unicorn plant is documented from at least 37 occurrences in Riverside, Imperial, San Bernardino, and San Diego Counties, several of which are from the Chuckwalla Mountains and Desert Center area; however, occurrences are relatively small and many of the local occurrences may be directly or indirectly affected by proposed solar Projects between Blythe and Desert Center. Although the direct effects of the GSEP on desert unicorn plant are minor, the impacts of all present and future projects (see Appendix E) on sensitive plants or on the sandy washes and important sediment transport that support the species on desert washes along the eastern base of the McCoy Mountains and the Palo Verde Mesa are cumulatively considerable. Indirect impacts to off-site (downstream) occurrences are also expected to indirectly affect the species habitat by altering the hydrology and sediment transport processes.

### Ribbed Cryptantha

Ribbed cryptantha is a CNPS 4.3 species, meaning that it has limited distribution in California; however it is not very threatened in California. There are 116 records of this species from several locations throughout Riverside, Imperial, San Diego, and Imperial counties in the Consortium of California Herbaria database; the nearest collection is from the Palen Valley approximately three miles east of the Desert Center Airport (CCH 2010).

Spring 2009 surveys identified a single population of a few ribbed cryptantha northwest of the Wiley's Well rest area at approximately 380 feet elevation from an area of mixed sand drifts, hummocks with Patton tank tracks with widely scattered shrubs (GSEP 2009f). Preliminary survey findings from spring 2010 estimated that several tens of thousands of individual plants and

large populations of ribbed cryptantha along the transmission line and buffer area (TTEC 2010m). In addition, several ribbed cryptantha plants and a large occupied habitat area of this species were identified within the six-pole extension area needed for the gen-tie transmission line associated with the SCE Colorado River Substation site (TTEC 2010o).

Many similarly large occurrences of ribbed cryptantha have been found during the spring surveys totaling over 100,000 plants and possibly many more. Because of the local abundance of this species in the GSEP vicinity and its apparently stable population in its range in California, the impacts of the GSEP are considered less-than-substantial.

#### Special-Status Plants that May Be Detected During the Summer-Fall 2010 Surveys

Within the larger group of plants that can only be identified during late season surveys, there are two subgroups: 1) annuals that are triggered by warm summer rains of subtropical origin (typically minimum 10 mm events), and 2) perennials that bloom regardless of the summer rain, and are triggered instead by the appearance of cooler storms that originate in the Pacific northwest. This discussion includes an analysis of impacts to 'potentially occurring' late-season special-status plants and the triggers for mitigation and specific mitigation measures. These triggers were designed to ensure that any anticipated or unanticipated species detected during the summer-fall 2010 surveys would be mitigated to levels less than substantial. This mitigation would be achieved through a variety of avoidance and minimization measures, restoration (enhancement projects), and compensatory mitigation through the acquisition and protection of other occurrences and their habitat.

It has been estimated that 30 to 40 percent of the species in the California Desert flora reach their reproductive maturity in late summer or fall (J. Andre pers. comm.). However, there is a long-standing precedent of spring season surveys for special-status plants in California, based on the dry summers and summer-dormant flora of the Mediterranean climate that dominates California. There are exceptions, of course, for late-season blooming species, but the plant survey effort in California typically consists of a major spring survey with narrowly focused summer surveys for any late season species that may occur in the region. Regional botanical experts (J. Andre, T. LaDoux as cited in the CEC RSA June 2010, D. Silverman, A. Sanders, pers. comm. as cited in the CEC RSA June 2010) have concluded that significant finds could be missed in the absence of an additional late season botanical survey.

Because the region's flora is so under-surveyed and poorly understood relative to other parts of the desert or state, and because its flora is so intertwined with its variable and unpredictable climate, it is difficult to predict accurately what special-status plants have potential to occur in this region. This is evidenced by the discovery of a potentially new taxon of saltbush on Palen Dry Lake (Andre pers. comm.), a new undescribed species of lupine on a renewable energy project near Barstow, a recent discovery of a new perennial spurge in the Orocopia Mountains (LaDoux pers. comm. as cited in the CEC RSA June 2010), and several unanticipated range extensions of special-status plants have been found, such Utah vining milkweed, and a slight range extension for Harwood's eriastrum. Additionally, some rare plants have been found in habitats not previously known to occur in. For

example, lobed ground cherry was recently discovered growing outside of its characteristic playa margin habitat in uplands (Andre pers. comm.).

Three late-season special-status plants were identified with moderate to high potential for occurrence based on the presence of suitable habitat and known occurrences in the region; their rarity, status, and known distribution are discussed below (Abram's spurge, flat-seeded spurge, and lobed ground cherry).

Several additional perennial species were identified with potential to occur; however, their bloom seasons overlap the spring survey window and it is expected that they would have been detected during a spring survey, if present. Nevertheless, summer-fall survey crews should be trained to recognize the following additional species: glandular ditaxis; California ditaxis; jack-ass clover, and Palmer's jack-ass clover (a proposed addition to the CNPS Inventory and known to occur at Palen Dry Lake in marginal dune habitats).

#### Abram's Spurge

Abram's spurge (CNPS List 2) has a NatureServe rank of G4/S1.2; i.e., it is 'critically imperiled' within its range in California. It is a summer annual that is triggered to germinate by significant summer monsoonal rains; consequently, its year-to-year population size is highly variable. It was not detected during the 2009 or 2010 spring surveys; however, the washes and other low-lying areas could support this species. This species is known to occur in halophytic flats, playas, and along inlets and floodplains of playas. It tends to prefer the lower floodplain ecotone but can also extend higher up along the washes that feed the playa (Silverman, pers. comm.). The blooming period is described in the CNPS Inventory (CNPS 2009) as September through November but it could be detected earlier if a significant (>0.10mm) summer rain event occurred in June. On average, August receives the most rainfall, but the warm monsoonal rains sometimes overlap the start of the fall-winter rains of Pacific Northwest origin.

When present, impacts to Abram's spurge would be considered substantial unless only a minor portion of its local population was affected. Even when found off-site in the playa margins, it could be indirectly affected by the diversion of the channels that support it, and the alteration of the site hydrology and sediment transport in the channels, which provide fresh, loose seed beds for many of the areas rare species. Global warming is expected to adversely affect annual species like Abrams spurge in the Sonoran Desert as rains are predicted to occur later in the fall when temperatures are cooler and not adequate for germination.

The CNDDB (CNDDB 2010) lists 15 occurrences of this plant in Riverside, Imperial, San Bernardino, and San Diego counties in California, east through Nevada to Arizona, and as far south as Baja California, Mexico. Of the total of 15 occurrences in California, 7 are protected under Park Service, CDFG, or State Park ownership. A total of 4 records are historical (pre-1972) that have not been confirmed since collected. One of these occurrences is described as threatened by grazing. A recent 2000 CNDDB record is from a location approximately 0.50 mile east of Ford Dry Lake on Gasline Road just south of I-10 and the occurrence was reported as a "substantial population" (CNDDB 2010).

When present, implementation of the off-site mitigation measures described in BIO-19, and the avoidance and minimization measures would be required to mitigate effects to Abram's spurge to a level less-than-substantial. Under certain conditions (see BIO-19), the level of protection would be increased and some onsite avoidance may be required.

### *Atriplex* sp. nov

A potentially new taxon of saltbush (*Atriplex*) was discovered on the saline playa margins of Palen Dry Lake last year by a botanist with the U.C. Reserve System (Andre and La Doux, pers comm). The BLM State Botanist and Plant Conservation Program Lead (Lund pers. comm.) indicated that BLM would treat all new taxa as BLM Sensitive species. The new taxon was not detected during the GSEP spring 2010 surveys but it is not clear whether it was included by field crews as a potentially occurring special-status plants. It could be detected during the summer-fall 2010 surveys, if present. No suitable habitat is present for this taxon in the solar fields but it could be indirectly affected by alterations of the surface drainage patterns between the solar fields when it occurs in the playa margins of Ford Dry Lake.

### Flat-seeded Spurge

Flat-seeded spurge is a CNPS List 1 B.2 species, meaning it is rare, threatened, or endangered throughout its range and it is fairly threatened in California. It is also a BLM Sensitive species and has a NatureServe rank of G3/S1.2. Some experts have speculated that it may be a "waif" in California, or a species that is not naturalizing, and note that it is more common in Arizona and Mexico (CDFG 2010). When present, impacts to flat-seeded spurge would be considered substantial unless only a minor portion of its local population was affected.

CEC staff reviewed the occurrence data in the Consortium of California Herbaria and detected 1 occurrence that was not in the CNDDB. This occurrence is a historical record from 1933. Of the total five occurrences in California (CNDDB plus new additional occurrences), only 1 is protected under State Park ownership. A total of three records are historical records. None of these occurrences have documented threats and the threat rank indicates that its distribution in California is relatively stable at this time. Likely indirect effects include the spread of Sahara mustard and Russian thistle across its habitat, and the premature stabilization of the dunes that support it. Channel diversion and the interruption of aeolian and fluvial sediment transport are also likely. Global warming is expected to disproportionately (and adversely) affect low elevation annual species like flat-seeded spurge in the Sonoran Desert.

BLM requests 100 percent on-site avoidance for BLM Sensitive plants but the BLM State Botanist will decide the level of avoidance on a case-by-case basis, when present.

### Lobed Ground Cherry

Lobed ground cherry is a CNPS List 2.3 species, meaning that is rare, threatened, or endangered in California, but more common elsewhere; the threat rank indicates that it is not very endangered in California. It has a NatureServe rank of G5/ S1.3, indicated that it is very rare in California but relatively stable outside of California. It occurs largely on alkaline dry lake beds but it has also

been found in drier, less saline-alkaline environments on decomposed granitic soils in Mojave desert scrub habitat.

Occurrence data were reviewed in the Consortium of California Herbaria and detected 2 occurrences that were not in the CNDDB. Both of these are more recent occurrences, including one from Joshua Tree National Monument and one in the eastern Mojave Desert. Of the total 6 occurrences in California (CNDDB plus new additional occurrences), none are protected under Park Service or other agency land ownership. None of these are historical records and none have documented threats.

Impacts to this very rare species in California would be substantial, unless only a minor portion of its local population was affected. Such an occurrence would also represent a significant range extension. Likely indirect effects, when present, would include the spread of Russian thistle across its habitat and potential OHV impacts from the creation of new access roads into its habitat. Even when found off-site in the playa margins, it could be indirectly affected by the diversion of the channels that support it, and the alteration of the site hydrology and sediment transport systems that support the dunes. Additionally, global warming is expected to adversely affect this annual species as rains are predicted to occur later in the fall (and thus in cooler temperatures not adequate to germinate many of the desert annuals). Implementation of the off-site mitigation measures described in BIO-19, and the avoidance and minimization measures would be required to mitigate the effects to a level less-than-substantial. Under certain conditions (see BIO-19), the level of protection would be increased and some onsite avoidance may be required.

#### Indirect Impacts to Special-Status Plants

The anticipated indirect impacts to special-status plants, i.e., impacts outside the Project Disturbance Area or that occur following construction include: introduction and spread of invasive plants; alteration of the surface hydrology and basic geomorphic processes that support rare plants and their habitat (e.g., disrupted aeolian and fluvial sand transport processes from obstructions and diversions); population fragmentation and disruption of gene flow; potential impacts to pollinators; increased risk of fire; erosion and sedimentation of disturbed soils which render the habitat vulnerable to invasion by pest plants; disturbance of the structure and ecological functioning of biological soil crusts which affect seed germination, reduce soil nutrition, carbon sequestration, and render the soil vulnerable to water and wind erosion (Belnap & Eldridge 2001 as cited in the CEC RSA June 2010); herbicide and other chemical drift; and disruption of photosynthesis and other metabolic processes from fugitive dust during construction and operation of the GSEP.

Following construction, exotic species that are characteristically opportunistic could occupy disturbed soils within the Project Disturbance Area and spread into adjacent vegetation communities. Invasive weeds with severe ecological impacts such as Sahara mustard can quickly colonize disturbed soils following construction. The primary conduit for spread, however, is along roads and transmission corridors. The dramatic increase in vehicle use of the GSEP vicinity roads and construction of transmission corridors and new roads is expected to increase the spread

of this highly invasive wildland pest. Sahara mustard has shown a clear negative impact on native flora (Barrows et al. 2009). Sahara mustard can form dense stands and potentially crowd out native annual plants. Sahara mustard plants growing early in the season may dominate available soil moisture which may adversely affect native annuals which start growing a little later in the season (Barrows et al. 2009). Barrows et al. (2009) found that native annuals growing under a canopy of Sahara mustard were often taller and were etiolated, at the expense producing branches, flowers, and fruits. This led to a shift in the dominance of the following year's species composition from native annuals to Sahara mustard.

Tamarisk, Russian thistle, Sahara mustard and Mediterranean grass are already present in the GSEP area and are expected to increase as a result of construction- and operation-related disturbance. The proliferation of many non-native plants has dramatically increased the fuel load and frequency of fire in many desert ecosystems (Lovich & Bainbridge 1999). Unlike other ecosystems in California, fire was not an important part of the Mojave Desert ecosystems and most perennials are poorly adapted to even low-intensity fires, and the animals that coevolved are not likely to respond favorably to fire either. The potential spread or proliferation of non-native annual grasses, combined with the proximity to ignition sources could potentially increase the risk of fire, and the effects to these poor-adapted desert communities would be harmful, particularly to cacti and most native shrubs species. Burned creosote and other native shrubs are typically replaced by short-lived perennials and non-native grasses (Brown & Minnich 1986). The spread of invasive plants is a major threat to vegetation resources in the Colorado Desert because non-native plants can displace native plants, increase the threat of wildfire, and supplant wildlife foods that are important to herbivorous species.

Wildfires (caused by construction or downed transmission lines) are rare but the increase in daily vehicle use in the area from an anticipated 200 new jobs during operation and up to 1,000 jobs during construction would substantially increase the risk of ignition. Other temporary and permanent impacts from the GSEP could occur to surrounding vegetation communities from grading activities creating air-born, fugitive dust, sedimentation, and erosion, which could result in disruption of photosynthesis and other metabolic processes. The destruction of plants and soil crusts by windblown sand and dust also exacerbates the erosion of the soil and accelerates the loss of nutrients (Okin et al. 2001).

## Alternatives

Table 4.17-1 shows differences between alternatives for direct and indirect impacts, if quantified. For the No Action/No Project Alternatives, no impacts would be anticipated to vegetation communities and Special Status Plants in the short term though impacts similar to those discussed for the Proposed Action or Reduced Acreage or Dry Cooling Alternatives could occur in the long term for No Action Alternative A and No Project Alternative C.

## Dry Cooling Alternative

Because this alternative would occupy essentially the same footprint as the Proposed GSEP, the impacts remain the same between the two except for impacts to groundwater-dependent

ecosystems. The Dry Cooling Alternative would use over 87 percent less groundwater than the Proposed GSEP. Indirect impacts to groundwater-dependent ecosystems under the Proposed GSEP are expected to be substantial if the water tables drop below the baseline spring water table levels necessary for healthy ecological functioning. Under the Dry Cooling Alternative, impacts to groundwater-dependent vegetation would not be substantial.

The direct and indirect impacts from the Proposed GSEP to Desert Dry Wash Woodland would be the same as the impacts to these resources under the Dry Cooling Alternative.

## Reduced Acreage Alternative

The Reduced Acreage Alternative would have smaller impacts on many of the vegetation resources within the GSEP area, including unvegetated ephemeral dry washes. The Reduced Acreage Alternative would have substantially less impact on stabilized and partially stabilized sand dunes because the Reduced Acreage Alternative does not extend into the sand transport corridor, and therefore has no indirect downwind impact to sandy habitats outside of the Disturbance Area (Table 4.17-1). In addition, the Reduced Acreage Alternative would use approximately 50 percent less groundwater than the Proposed GSEP, though it would still use a substantial amount. Both the Proposed Action and the Reduced Acreage Alternative would impact groundwater-dependent ecosystems through this use of groundwater. Because the linear facilities for the Proposed Action and the Reduced Acreage Alternatives share the same route, impacts associated with this corridor are very similar; impacts to Desert Dry Wash Woodland remain the same for both the Proposed Action and this alternative for this reason. In addition, although the Reduced Acreage Alternative represents fewer acres of impacts, it would indirectly impact desert washes that currently flow through the area.

Direct and indirect impacts from the Proposed Action and the Reduced Acreage Alternative are similar (aside from differences in impact acreage) for most impacts associated with the Proposed Action, including those to Desert Dry Wash Woodland. While impacts from the Reduced Acreage Alternative are substantially less to desert washes, these impacts would still be considered substantial under this alternative as well as under the Proposed Action and Dry Cooling Alternative. There is insufficient information to fully assess indirect and cumulative impacts to groundwater-dependent vegetation, but these impacts may be considered substantial under the Proposed Action and the Reduced Acreage Alternative.

## No Action Alternative A

Under this alternative, the Proposed GSEP would not be approved by the Energy Commission and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site, and no impacts

to sensitive vegetation resources. However, the land on which the GSEP is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment, with potentially similar impacts as described for the Proposed Action, Dry Cooling, and Reduced Acreage Alternatives. In addition, in the absence of the GSEP, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects may have some similar impacts in other locations.

### No Project Alternative B

Under this alternative, the Proposed GSEP would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, new impacts to vegetation resources would not occur, as such, this No Project Alternative would not result in impacts to vegetation resources that would occur under the Proposed GSEP. However, in the absence of the GSEP, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects may have some similar impacts in other locations.

### No Project Alternative C

Under this alternative, the Proposed GSEP would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, sensitive vegetation resources would be impacted. Different solar technologies require different amounts of land, placement, grading and maintenance; however, it is expected that all the technologies would require a large area of land. As such, this No Project Alternative could result in biological resource impacts similar to the impacts under the Proposed Action, Dry Cooling, and Reduced Acreage Alternatives.

## 4.17.3 Discussion of Cumulative Impacts

Cumulative impacts are analyzed in detail in **Appendix E**. Cumulative impacts would vary by alternative only to the degree to which direct and indirect impacts would vary by alternative.

### Cumulative Impacts

Cumulative impacts would vary by alternative only to the degree to which direct and indirect impacts would vary by alternative.

Construction and operation of the GSEP would have effects on a number of vegetation resources that are individually limited but cumulatively considerable. In conducting the cumulative effects analysis, a quantitative, GIS-based analysis of direct impacts to habitat, and a qualitative analysis of indirect effects, were employed. Geographic scope varied between vegetation resources, but most analyses were based on the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) boundaries. Substantial cumulative effects were identified to: desert washes in the Chuckwalla-Ford Dry Lake watershed and the broader NECO planning area; desert tortoise habitat; golden eagle foraging habitat; Mojave fringe-toed lizards and their habitat; habitat for American badger, desert kit fox, and burrowing owl; Le Conte's thrasher habitat; Couch's spadefoot toad range; habitat for Harwood's milk-vetch and other dune/playa-dependent special-status plants; wildlife habitat and connectivity within the Palen-Ford WHMA (for Mojave fringe-toed lizard, dunes, and playa); Mojave and Sonoran creosote bush scrub; desert dry wash woodland; playa and sand drifts over playa; and dunes. Implementation of proposed mitigation measures would reduce the GSEP's contribution to cumulative effects to a level that is not cumulatively considerable. The detailed cumulative effects analysis is included in Genesis Appendix E, Biological Resources Detailed Cumulative Effects Analysis.

Construction and operation of the GSEP would have effects on a number of vegetation resources that are individually limited but cumulatively considerable. The cumulative effects analysis employed a quantitative, GIS-based analysis of direct impacts to habitat, and a qualitative analysis of indirect effects (e.g., increases in predators, noxious weeds, etc.). In many cases, the anticipated indirect effects are more substantial, or adverse, than the direct loss of habitat, but are more difficult to quantify. Geographic scope varied between vegetation resources, but most analyses were based on the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) boundaries (BLM CDD 2002).

Substantial cumulative effects (including indirect effects) were identified in a number of biological resource areas where the GSEP contributes—at least incrementally—to the cumulative effect. These include: desert washes in the Ford Watershed and the broader NECO planning area; habitat for Harwood's milk-vetch and other dune/playa-dependent special-status plants; wildlife habitat and connectivity within the Palen-Ford WHMA (for Mojave fringe-toed lizard, dunes, and playa); Mojave and Sonoran creosote bush scrub; desert dry wash woodland (microphyll woodland); playa and sand drifts over playa; and dunes (active and stabilized). Table 4.17-2 summarizes these cumulative impacts.

Implementation of proposed Mitigation Measures would reduce the GSEP's contribution to cumulative effects to a level that is not cumulatively considerable. There may be cumulative effects after mitigation is implemented by all projects, but due to the mitigation implemented by the GSEP, its contribution would be less than cumulatively considerable. These residual cumulative effects from all future projects could be addressed through a regional and coordinated planning effort aimed at preserving and enhancing large, intact expanses of wildlife habitat and linkages, including maintaining connections between wildlife management areas and other movement corridors.

**TABLE4.17-2**
**SUMMARY OF CUMULATIVE IMPACTS TO VEGETATION RESOURCES**

| Biological Resource | Cumulative Impact |
|---|---|
| Sonoran Creosote Bush Scrub & Associated Wildlife | Contributes 0.8% to cumulative loss from probable future projects within the NECO planning area. |
| Ephemeral Drainages (including Waters of the State) & Associated Sensitive Plant Communities | Contributes 2.9% to cumulative loss from future projects within the NECO planning area; contributes 4.6% to cumulative loss from future projects within the Chuckwalla- Ford Dry Lake watershed. |
| Special-status Plants<br>• Harwood's eriastrum<br>• Harwood's milk-vetch<br>• Ribbed cryptantha<br>• Desert unicorn plant<br>• Late-season special-status plants | Contributes to cumulative loss of plants and habitat, and indirect effects to Harwood's eriastrum, Harwood's milk-vetch, desert unicorn plant and ribbed cryptantha from other I-10 corridor projects and throughout range. Contributes 0.7% to cumulative loss of Harwood's milk-vetch habitat from future projects within the NECO Planning Area. Contributes cumulative loss of dune-, playa-, and wash habitat for other special-status species in Chuckwalla Valley: 4.6% desert washes in Chuckwalla Valley; 1.7% dunes and sand fields; 0.2% playa. |
| Groundwater-Dependent Plant Communities | Degradation of groundwater-dependent plant communities (e.g., mesquite bosque, bush seep-weed) from water table drawdown |

[a] From CEC 2010d (TetraTech table "Anticipated Direct and Indirect Impacts to Vegetation Communities").
[b] From TTEC 2010l (TetraTech memo "Revisions to Jurisdictional Waters for the Genesis Solar Energy Project").
[c] From TTEC 2010j (TetraTech Notification of a Lake or Streambed Alteration Agreement Application, Appendix D).
[d] From TTEC 2009c (TetraTech Application for Incidental Take of Threatened and Endangered Species).
[e] From Soil & Water Appendix A, calculation of the downwind impacts to Mojave fringe-toed lizard habitat from Project intrusion into sand transport corridors.
[f] From TTEC 2010o (Tetra Tech memo "Minor Changes to the Genesis Solar Energy Project Description: 6-pole Extension of Transmission Line; Inclusion of Distribution and Telecommunications Line; Removal of "Toe" Area from Plant Facility").

## Reasonably Foreseeable Development Scenario: Southern California Edison Colorado River Substation

This subsection provides an overview of potential impacts to biological resources from construction of Southern California Edison's (SCE's) proposed 230 kV expansion of the already-permitted (but not yet constructed) 500 kV Colorado River Substation. Unlike the transmission line that would go from the GSEP power plant to the Colorado River Substation (the "gen-tie") SCE's Colorado River Substation is not part of the GSEP description. Rather, SCE would acquire a permit from the California Public Utilities Commission, and would construct, own and operate the Colorado River Substation to serve several projects in the area. SCE would provide an analysis of impacts to biological resources and mitigation for those impacts resulting from construction of the Colorado River Substation. However, because the proposed expansion of the Colorado River Substation is a reasonably foreseeable development, a description of the expansion and potential impacts to biological resources is included here. The purpose of the discussion in this subsection is to inform all interested parties of the potential for impacts to biological resources that may result from other actions related to the GSEP.

### Impacts to Biological Resources from Colorado River Substation Expansion

The Colorado River Substation expansion would be constructed within sand dune habitat. The basis for this inference is Figure DR-BIO-51-2 from the Data Response submitted for the Blythe Project (AECOM 2010e). This figure shows, at a scale of 1 inch = 6000 feet, the approximate location of the proposed Colorado River Substation and depicts it as being entirely within

stabilized and partially stabilized sand dune. Based on the information from the Blythe Project 2010 surveys (TTEC 2010o, Attachment A, Figure 2 - Preliminary Results Botany Rare Plants Spring 2010 Surveys, and Figure 4 - Incidental Wildlife Observations Spring 2010 Surveys and TTEC 2010p), a number of sensitive sand dune-dependent species are likely to be directly impacted by expansion of the Colorado River Substation. Many Mojave fringe-toed lizards were detected in and near the proposed Colorado River Substation, as well as numerous rare plants, including Harwood's eriastrum, Harwood's milk-vetch, winged cryptantha and ribbed cryptantha.

Harwood's eriastrum, a California endemic and BLM Sensitive species, has a global distribution restricted to the southeast corner of California, and it is known from only 14 documented locations. As described above in the subsection on impacts to special-status plants, direct or indirect impacts to Harwood's eriastrum or Harwood's milk-vetch would be substantial. Late summer/fall botanical surveys might also reveal the presence of additional sensitive plant species in the vicinity of the proposed substation expansion.

Even when the substation expansion avoided direct impacts to these sensitive sand dune species, indirect impacts are likely to occur. Alterations in drainages could adversely affect special-status plant populations that occur downstream of the project area. Other indirect effects include the spread of the non-native Sahara mustard and other non-native invasive species, which degrade sand dune habitat by prematurely stabilizing dunes. Transmission line maintenance activities and an increase in OHV use from the construction of roads into previously inaccessible areas could also adversely affect sand dune dependent plant and animal species.

## 4.17.4 Summary of Mitigation Measures

The mitigation measures imposed by the California Energy Commission as Conditions of Certification for the GSEP would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix F. The following mitigation measures would avoid or minimize impacts on vegetation resources[1]:

> BIO-1, BIO-2, BIO-3, BIO-4, BIO-5, BIO-6, BIO-7, BIO-8, BIO-14, BIO-19, BIO-22, BIO-23, BIO-24, BIO-25, BIO-26, BIO-29

Moreover, to address potential impact to Climate Change, the BLM would require, in concert with BIO-7, the following:

> **BLM BIO-7a:** The Applicant shall ensure that monitoring accomplished under BIO-7 and other mitigating measures use available climatalogical data when analyzing project effects or resource trends.

Tables 4.17-3 and 4.17-4 summarize the recommended compensatory mitigation identified for Vegetation and Wildlife Resources from this project's Proposed Action, Dry Cooling Alternative, and Reduced Acreage Alternative. These tables also apply, in part, to Section 4.21, Wildlife Resources, but are not duplicated there.

[1] The CEC document intertwined vegetation and wildlife resources in the mitigation measures and these have not been modified because as a whole they mitigate the impacts to vegetation and wildlife resources.

**TABLE 4.17-3**
**ACREAGE OF DIRECT AND INDIRECT IMPACTS TO VEGETATION AND WILDLIFE RESOURCES AND RECOMMENDED COMPENSATORY MITIGATION FOR PROPOSED ACTION**

| Resource | Acres Impacted | Mitigation Ratio | Recommended Mitigation Acreage |
|---|---|---|---|
| Desert Tortoise Habitat – Direct Impacts | | | |
| Within DWMA/Critical Habitat[a] | 24 | 5:1 | 120 |
| Outside Critical Habitat[b,g] | 1,750 | 1:1 | 1,750 |
| ***Total Desert Tortoise Mitigation*** | | | ***1,870*** |
| Stabilized/Partially Stabilized Sand Dunes – Direct Impacts | | | |
| Direct Impacts[c,g] | 7.5 | 3:1 | 22 |
| Playa and Sand Drifts Over Playa | | | |
| Direct Impacts[c,g] | 38 | 3:1 | 114 |
| Indirect Impacts to MFTL Habitat[d,h] | 151 | 0.5:1 | 76 |
| ***Total Mojave Fringe-toed Lizard Mitigation*** | | | ***212*** |
| Ephemeral Drainages | | | |
| **State Waters**[i] – Direct Impacts[e] | | | |
| Microphyllous Riparian Vegetation | 16 | 3:1 | 48 |
| Unvegetated Ephemeral Dry Wash | 53 | 1:1 | 53 |
| **State Waters** – Indirect Impacts[f] | | | |
| Unvegetated Ephemeral Dry Wash | 21 | 0.5:1 | 10 |
| ***Total State Waters Mitigation*** | | | ***111*** |

a From Application for Incidental Take Permit (TTEC 2009c).
b From CEC 2010d (TetraTech table "Anticipated Direct and Indirect Impacts to Vegetation Communities"); includes impacts to Sonoran creosote bush scrub.
c From CEC 2010d; includes direct permanent impacts to stabilized and partially stabilized sand dunes and sand drifts over playas.
d From CEC Genesis Revised Staff Assessment Soil & Water Appendix A, calculation of the downwind impacts to Mojave fringe-toed lizard habitat from Project intrusion into sand transport corridors.
e From TTEC 2010l (TetraTech memo "Revisions to Jurisdictional Waters for the Genesis Solar Energy Project").
f From Appendix D, Lake and Streambed Alteration Agreement Application (TTEC 2009d).
g From TTEC 2010o (Tetra Tech memo "Minor Changes to the Genesis Solar Energy Project Description: 6-pole Extension of Transmission Line; Inclusion of Distribution and Telecommunications Line; Removal of "Toe" Area from Plant Facility").
h PWA 2010a. (tn pending) PWA memo "Genesis Solar Energy Project, Analysis of Impacts to Sand Transport Corridor")...
i Reflects changes Also, the removal of the 'toe' from the plant site footprint would also reduce impact acreage to state waters; however these reduced impact calculation have not been provided to date and therefore, are not included in this table.
9 Revised per TTEC 2010s (Supplemental Information Genesis Solar Energy Project June 18, 2010) to include 6.5 acres of impact to sand dunes from the six-pole extension of the gen-tie line north of the Colorado River Substation. Acreage of 3.2 acres of impact from construction of distribution/telecommunications line is not yet included here or in the Sonoran creosote scrub, pending clarification regarding the upland habitat types that will be impacted by the distribution/telecommunications line.
10 Revised per TTEC 2010s (Supplemental Information Genesis Solar Energy Project June 18, 2010) to reduce the impact to state waters by 21 acres, reflecting elimination of the 41.4 acre "toe" at the easternmost solar field.
11 Includes one additional acre of direct impact (rounded up from 0.84 acre) due to construction of the distribution/telecommunications line.

## 4.17.5 Residual Impacts after Mitigation

The Proposed Action, Dry Cooling, and Reduced Acreage Alternatives would have substantial impacts to vegetation resources, eliminating all of the Sonoran creosote bush scrub and other native plant communities within the approximately 1,800-acre site, including 90 acres of desert washes. Without mitigation the GSEP would contribute to the cumulatively substantial loss of vegetation resources within the Chuckwalla Valley and the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) area. Recommended avoidance and minimization measures as well as compensatory mitigation to offset direct, indirect, and cumulative impacts to

**TABLE 4.17-4**
**COMPARISON OF COMPENSATORY MITIGATION REQUIREMENTS FOR PROPOSED ACTION, DRY COOLING, AND REDUCED ACREAGE ALTERNATIVE**[a]

| Resource | Mitigation Ratio | Proposed Proposed Action/ Dry Cooling Alternatives (acres) | Reduced Acreage Alternative (acres) |
|---|---|---|---|
| Microphyll woodland – Direct Impacts | 3:1 | 48 | 48 |
| Unvegetated, ephemeral dry wash – Direct Impacts | 1:1 | 53 | 51 |
| Unvegetated, ephemeral dry wash – Indirect Impacts | 0.5:1 | 10 | 10 |
| ***Total state waters mitigation*** | | ***111*** | ***109*** |
| DT habitat within CHU[b] | 5:1 | 120 | 120 |
| DT habitat outside CHU[c] | 1:1 | 1,750 | 1,016 |
| ***Total desert tortoise mitigation*** | | ***1,870*** | ***1,136*** |
| MFTL habitat (sand dunes) – Direct Impacts[d] | 3:1 | 22 | 22 |
| MFTL habitat (playa and sand drifts over playa) – Direct Impacts | 3:1 | 114 | 132 |
| MFTL habitat (sand dunes, playa, other) – Indirect Impacts[e] | 0.5:1 | 76 | 0 |
| ***Total sand dune/MFTL mitigation*** | | ***212*** | ***154*** |

[a] Reflects revised acreage impacts from TTEC 2010m, CEC Revised Staff Assessment Supplement
[b] From Application for Incidental Take Permit (TTEC 2009c).
[c] *Proposed Project*: From CEC 2010d (TetraTech table "Anticipated Direct and Indirect Impacts to Vegetation Communities").
*Reduced Acreage Alternative*: Estimate only, from Biological Resources Appendix E and TTEC 2009d.
[d] Stabilized and partially stabilized sand dunes, see source information for **Biological Resources Table 7**
[e] From CEC Genesis Revised Staff Assessment Soil and Water, Appendix A and PWA 2010a**.**

natural plant communities, sensitive communities, and special-status plant species, would assure compliance with state and federal laws such as the federal and state endangered species acts and regulations protecting waters of the state. With implementation of proposed mitigation measures, GSEP impacts to vegetation resources would be reduced, although net losses in vegetation resources would occur.

## 4.17.6 Unavoidable Adverse Impacts

The GSEP and other action alternatives would result in substantial impacts to sensitive vegetation resources, and would permanently diminish the extent and value of native plant and animal communities in the region.

Under the technology proposed in the three action alternatives (the Proposed Action, Dry Cooling, and Reduced Acreage Alternatives), natural vegetation communities and individuals and local populations of special-status plants not otherwise avoided under proposed mitigating measures would be lost from the GSEP area, totaling 1,746, 1,746, and 950 acres, respectively. The GSEP would result in loss of an extensive network of desert washes comprising 90 acres of state jurisdictional waters, and would substantially alter the hydrology of the area by re-routing ephemeral drainages through engineered channels. Dunes and sand transport would be affected as well. Despite mitigating measures, the chance of invasion and spread of weeds and the chance of human-caused wildfires would persist to the areas surrounding the GSEP, threatening the surrounding vegetation and special status plant species.

# 4.18 Impacts on Visual Resources

This section discusses effects on visual resources that would occur with implementation of the proposed action and alternatives, cumulative effects, and mitigation measures to avoid or reduce visual effects. Overall, the GSEP would result in long-term visual alteration to approximately 1,746 acres of land with a scenic quality rating of C[1], a high visual sensitivity, and within the foreground distance zone. As discussed in Section 3.19, the GSEP would result in visual disturbance within BLM land with an Interim VRM Class III rating.

## 4.18.1 Impact Assessment Methodology

Visual resource effects are created when the physical characteristics of facilities associated with proposed actions contrast with natural characteristics of the landscape setting. Contrast is measured by a systematic evaluation of the basic design elements of form, line, color, texture and scale, in accordance with the BLM's Handbook H-8431-1, Visual Resource Contrast Rating. It is the primary tool used to measure the intensity of adverse visual effects to visual resources. Should the contrast rating reveal nonconformance of the proposed action with the established Interim VRM Class objectives (see Section 3.19), and mitigation measures are insufficient to bring the project into compliance, then the design would need to be mitigated to the greatest extent possible, and would need to meet the VRM Class objective at a minimum. If the project cannot be mitigated to meet the VRM Class objective, then the project application may not be approved, or may be redesigned or relocated to meet the objective.

The GSEP is evaluated for conformance with the following MUC and VRM objectives:

- *Multiple-Use Class M* (Moderate Use) is based upon a controlled balance between higher intensity use and protection of public lands. This class provides for a wide variety or present and future uses such as mining, livestock grazing, recreation, energy, and utility development. Class M management is also designed to conserve desert resources and to mitigate damage to those resources which permitted uses may cause.

- *VRM Class III* objective is to "***partially retain*** the existing character of the landscape. The level of change to characteristic landscape should be ***moderate***. Management activities may attract attention but ***should not dominate the view*** of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape."

Since the overall VRM goal is to minimize visual impacts, mitigating measures must be prepared for all adverse contrasts that can be reduced, even if the proposed action meets VRM objectives. Further, in addition to permanent visual contrast created in the landscape, the GSEP is analyzed for adverse effects due to lighting and glare, as well as temporary construction disturbances.

[1] Scenic quality is rated in three categories from A (most scenic) to C (least scenic). See Section 3.19 for a discussion of scenic quality ratings.

## Visual Contrast Rating Process

The degree to which the GSEP adversely affects the visual quality of a landscape is directly related to the amount of visual contrast between it and the existing landscape character. The degree of contrast is measured by separating the landscape into major features (land/water, vegetation, structures) then assessing the contrast introduced by the project in terms of the basic design elements of form,[2] line,[3] color, and texture. The contrast of the GSEP with landscape elements is then rated as none, weak, moderate or strong, as defined in Table 4.18-1. The purpose of this method is to reveal elements and features that cause the greatest visual impact, and to guide efforts to reduce the visual impact of a proposed action or activity. This process is described in detail in Handbook H-8431-1, Visual Resource Contrast Rating, and documented using BLM Form 8400-4 (see Appendix F).

**TABLE 4.18-1**
**VISUAL CONTRAST RATINGS**

| Degree of Contrast | Criteria |
|---|---|
| None | The element contrast is not visible or perceived. |
| Weak | The element contrast can be seen but does not attract attention. |
| Moderate | The element contrast begins to attract attention and begins to dominate the characteristic landscape. |
| Strong | The element contrast demands attention, will not be overlooked, and is dominant in the landscape. |

SOURCE: BLM Manual 8431

The criteria for visual contrast are aligned with the management objectives for each Interim VRM Class. For example, if a project results in a weak visual contrast, it is likely to be in conformance with Interim VRM Class II, whereas a project that results in a moderate contrast would likely be in conformance with VRM Class III objectives but would not conform to VRM Class II objectives. Only surface disturbances resulting in a strong visual contrast would not be in conformance with VRM Class III objectives.

## Selection of Key Observation Points

The contrast rating is completed from the most critical viewpoints, or Key Observation Points (KOPs). The intent of establishing KOPs is to visualize the contrast created by the proposed action from locations most representative of how the public perceives the affected landscape. The "public" may include highway travelers, travelers on local roads, off-highway vehicle users, dispersed recreational users such as RV campers and hikers in surrounding wilderness areas, or users of BLM facilities, such as long-term visitor areas. The sensitivity of these diverse user

[2] Contrast in form results from changes in the shape and mass of landforms or structures. The degree of change depends on how dissimilar the introduced forms are to those continuing to exist in the landscape.

[3] Contrasts in line results from changes in edge types and interruption or introduction of edges, bands, and silhouette lines. New lines may differ in their sub-elements (boldness, complexity, and orientation) from existing lines.

groups to changes in the landscape are influenced by a number of factors, including how prominent the view of the proposed project is (in terms of scale, distance and angle of observation), the frequency and duration that viewers are exposed to the view, and whether the viewer groups are aware of their surroundings or expectant of high-quality views.

Based on the above factors, and in consultation with BLM staff, three KOPs (Figure 4.18-1) were selected to evaluate the GSEP site's existing conditions and potential visual contrast. No KOPs were selected in the BLM Palen-McCoy Wilderness, located immediately to the north, because while technically accessible, the wilderness does not have maintained trails or trail heads, and is scarcely visited by the public (BLM Greg Hill, 2009). However, to demonstrate how the scale and dominance of the GSEP changes with angle of view and elevation differences, this analysis includes an oblique aerial perspective of the GSEP. In addition, there is no KOP to simulate the proposed transmission line as it crosses I-10. However, a visual simulation of the transmission line for the proposed Blythe Solar Power Plant, located 10-15 miles to the east in the same landscape setting is used to approximate the visual contrast created by the GSEP transmission line from a viewpoint along I-10. The location and characteristics of each KOP is summarized in Table 4.18-2.

**TABLE 4.18-2**
**KOP LOCATION AND CHARACTERISTICS**

| ID | Name | Distance to GSEP and View Direction[a] | Distance Zone[b] | Primary User Type | Description |
|---|---|---|---|---|---|
| KOP 1 | Ford Dry Lake Bridge Over I-10 | 3.2 to 4.9 miles, north view | Foreground/ Middleground | Interstate Travelers | Point on I-10 that is nearest to the proposed project, KOP is on elevated bridge. |
| KOP 2 | Wiley's Well Bridge Over I-10 | 8.4 to 12.5 miles, northwest view | Background | Interstate Travelers / Rest Area | Point is on Wiley Well Road over I-10. The exit contains a rest area, and a local road which leads south to the Ironwood and Chuckwalla Valley Prisons, as well as the Mule Mountains LTVA. |
| KOP 3 | Corn Springs BLM Road | 9.0 to 14.25 miles, east view | Background | Recreation/ Camping | This is a road that leads to the BLM Corn Springs Campground. |

[a] Distance includes closest distance and furthest distance to the GSEP site
[b] Distance zones as defined by BLM convention (0 to 5 miles is foreground/middleground, and 5 to 15 miles is background

The basis of selecting these three KOPs was that each one displays a different location from which sensitive receptors can view the Project, and accurately represents how the Project would appear when seen from different distance zones (foreground/middleground, or background). While several local roads lead to campgrounds, as indicated in the description for KOP 2 and 3; the GSEP would not be visible from these campgrounds due to the distances involved, topographic screening, and low elevation differences.

## Visual Simulations

Photographs were taken at each viewpoint and each KOP with a Canon-50D digital camera equipped with a zoom lens with the focal length set so that it provides a "normal view," thereby eliminating distortion. For comparison to this "normal lens," a wide angle lens makes background features appear unrealistically small and farther away, while a telephoto lens makes background features unrealistically larger and closer in the photograph. The normal lens makes all landscape features appear in their proper perspective and size, relative to each other. When on 8½x11-inch paper and held approximately 10 inches from the eye, each photograph appears "life-size" as viewed from on the ground at the exact camera location.

Computerized visual simulations were prepared using AutoCAD and 3DStudio software to create accurate, computerized depictions showing the visual effects of the Project. Using the computerized visual simulations, predicted future visual effects of the Project for each KOP are described in the section below, and contrast rating forms were completed based on the visual simulations (and included in Appendix F).

# 4.18.2 Direct and Indirect Impacts

## Proposed Action

There are no indirect impacts of the GSEP with respect to visual resources.

### *Project Appearance*

The proposed action would convert approximately 1,746 acres (about 2.8 square miles) of naturally-appearing desert plain to an industrial facility characterized by complex, geometric forms and lines and industrial surfaces that are dissimilar to the surrounding natural landscape character. Much of the developed area would be covered with the arrays of parabolic mirrors that would be used to collect heat energy from the sun. Figure 4.18-2 presents an image of the Kramer Junction SEGS project solar troughs, which are smaller in scale than those proposed for GSEP, but provide a visual example of a solar plant using parabolic mirrors. In addition, Figure 4.18-3 presents aerial views of existing solar trough energy projects. Table 4.18-3 provides a list of the major project features that would contribute to the apparent visual change of the landscape, including their height and color. The arrays of solar collector assemblies, which would be a maximum of 22 feet high, would occupy most of the disturbed area. Two identical power blocks would occupy smaller areas, but would contain various buildings and structures needed for electrical generation, several of which would be as high as 50 feet. The proposed transmission lines leading away from the main generation facility would be approximately 75 feet high, would cross I-10 from north to south at Wiley's Well Road, and would join the Blythe Energy Project Transmission Line a short distance south of I-10 along Wiley's Well Road.

Chapter 2 provides a detailed description of the power plant civil/structural features. Generally, the collector field consists of multiple single-axis parabolic trough solar collectors, aligned on a north-south axis. Each parabolic trough focuses the sun's rays on a linear, length-wise heat collection element at the parabolic focal point. The primary project features include:

**TABLE 4.18-3**
**APPROXIMATE DIMENSIONS OF GSEP STRUCTURES**

| Structure | Quantity | Height (ft) | Length (ft) | Width (ft) | Color[a] |
|---|---|---|---|---|---|
| Water Treatment Building | 2 | 50 | 75 | 60 | Tan |
| Electrical Building | 2 | 20 | 60 | 40 | Tan |
| Cooling Tower Electrical Buildings | 2 | 12 | 30 | 20 | Tan |
| Heat Transfer Fluid Pump Area | 2 | 5 | 60 | 25 | Gray |
| Demineralization Water Tank | 2 | 17 | N/A | 20 | Tan |
| Raw/Fire Water Tank | 2 | 28 | N/A | 55 | Tan |
| Treated Water Tank | 2 | 38 | N/A | 75 | Tan |
| Waste Water tank | 2 | 27 | N/A | 40 | Tan |
| Control Room/Warehouse in Power Block | 2 | 50 | 60 | 60 | Tan |
| HTF Expansion Tanks | 8 | 25 | 50 | 14 (diameter) | Tan |
| Auxiliary Boiler | 2 | 13 | 26 | 12 | Gray |
| Emergency Diesel Generator | 2 | 15 | 32 | 12 | Gray |
| Fire Pump House | 2 | 25 | 33 | 11 | Tan |
| Generator Step-Up Transformer | 2 | 25 | 40 | 30 | Gray |
| Administration/Warehouse Building | 1 | 50 | 225 | 60 | Tan |
| Cooling Tower Chemical Feed | 2 | 20 | 50 | 25 | Gray |
| Steam Turbine Generator Building | 2 | 30 | 100 | 15 | Tan |
| Solar Collectors | 1760 | Varies | 492 | Varies | Gray bottom & mirror top |
| Transmission Line Monopoles and Arms | 59 | 75 | N/A | N/A | Dulled Galvanized Steel |

NOTES:
[a] Colors of exterior building surfaces will be selected in consultation with BLM.

1. Two power blocks, one per plant, including steam turbine generators and related equipment;

2. An administrative building and warehouse shared between the two power plants; a control building within each power block; a water treatment building and other structures with an overall area of approximately 39,000 square feet (0.9 acre);

3. Two 500,000 gallon cooling water storage tanks; a 1,250,000 gallon treated water storage tank; a 250,000 waste water storage tank; a 40,0000 gallon demineralized water storage tank;

4. Two wet cooling towers;

5. A 270-by-400-foot switchyard;

6. Thirty five acres of paved area;

7. And two 24-acre of evaporation ponds (one per generation unit, located between the two mirror fields).

### *Construction-Phase Impacts*

During the construction period, earth-moving activities and construction materials, equipment, trucks, and parked vehicles, all could be visible on the site and along the transmission line ROW. Construction would occur over a 39 month period, during which a number of activities would take place, including large-scale vegetation removal, earthwork, as well as foundation and equipment installation. From the more common viewpoints (e.g. I-10), these construction activities would generally result in a high degree of visual contrast within the landscape, which would be similar to or the same as the discussion of visual contrast ratings discussed under operation-phase impacts.

However, certain visual effects will be specific to construction activities, and could include the generation of large quantities of airborne dust, nighttime construction lighting, and the establishment of offsite staging/laydown areas. The affected viewers would be primarily motorists on I-10, users of the Wiley's Well Rest Area, and dispersed recreational users accessing campgrounds via Wiley Well Road and Corn Springs Road to the south of I-10. Although the construction period is estimated to be over three years, construction would be phased, so that it would not occur in any one place for the entire period. Activities that would generate dust, such as earthmoving, would occur episodically throughout the construction period, and nighttime construction lighting, if required, would not be needed on a continuous basis. There are no permanent residences in the vicinity of the site; and thus few, if any viewers would be subject to all of the construction-related visual effects. However, the visual effects of construction activities could be considered visually unappealing and adverse for dispersed recreational users, or particularly sensitive users of Wiley Well Rest Area.

To address these potential impacts, construction activities would be conducted in a manner that minimizes (visible) dust emissions, as described in Mitigation Measure AQ-SC3 and AQ-SC4. These measures would include limiting the speed of vehicles, surfacing construction access roads, and controlling wind erosion on soil stockpiles and exposed earth. When nighttime construction activities take place, illumination would be provided that meets state and Federal worker safety regulations. The nighttime construction lighting would be directed downward or toward the area to be illuminated and would incorporate fixture hooding/shielding, as described in Mitigation Measure VIS-2. Task-specific lighting would be used to the extent practical while complying with worker safety regulations. Disturbed areas that would not be needed during operation and maintenance of the GSEP would be revegetated according to Mitigation Measure BIO-24, as well as VIS-6. Mitigation Measure BIO-24 includes a performance standard that the coverage and species composition of the restored areas be the same as that which naturally occurs in the adjacent desert scrub or dune habitats. Further, Mitigation Measure VIS-6 requires that temporarily disturbed areas be recovered with soil, brush, rocks, and natural debris. This would reduce the contrast of temporarily disturbed areas until vegetative restoration is achieved.

In addition, laydown for construction of the proposed transmission line is proposed near the Wiley's Well Rest Area. Because of proximity to potential viewers, this laydown area could potentially be visually prominent, and represent an adverse effect on the visual quality of the rest area for the visitors to this facility over the period of transmission line construction. Although the

visual impact would only be experienced temporarily while motorists stop at the rest area, due to the high number of potentially affected viewers, this could represent an adverse visual effect. In order to minimize these impacts, Mitigation Measure VIS-5 would include screening of the laydown area with earth berms, opaque fencing, and/or other measures to minimize visibility from within the main rest area. After completion of construction, the laydown area would be revegetated and restored in accordance with Mitigation Measure BIO-24 and VIS-6, as described above. With these recommended measures, visual impacts from the laydown area would be reduced to minor levels.

In summary, the generation of large quantities of airborne dust, nighttime construction lighting, and the use of the staging area near Wiley's Well Rest could result in temporary adverse visual impacts to motorists on I-10 and the rest area. Because the level of dispersed recreational use in the area is low, and the highway travelers would only be exposed to the adverse construction related effects briefly, the impact would be considered moderate. These impacts would be reduced with implementation of Mitigation Measures AQ-SC3, AQ-SC4, VIS-2, VIS-5, VIS-6 and BIO-24. These mitigation measures would reduce the visual impacts from airborne dust generation, nighttime construction lighting, and staging area disturbances to minor levels.

## *Operation-Phase Impacts*

During the operation of the project, visual effects would be caused by the visible elements of the GSEP. The discussion below is divided between visual effects that are not captured by visual simulations (nighttime lighting, reflected sunlight/glare, and visible vapor plumes), and the visual contrast ratings of the project simulated in each KOP.

### Light and Glare (all KOPs)

While the potential for glint or glare, as well as nighttime lighting, is a component of visual contrast, these issues are treated separately because the simulations used in the visual contrast rating process model the daytime visual change, and do not consider the effect of temporary glare. Analysis of potential light and glare impacts with regard to visual resources considers the following:

1. *Artificial sky glow*: The brightening of the night sky attributable to human-created sources of light.

2. *Glare*: Light that causes visual discomfort or disability or a loss of visual performance.

3. *Spill light*: Light from a lighting installation that falls outside of the boundaries of the property on which the installation is sited.

4. *Light trespass*: Spill light that because of quantitative, directional, or type of light causes annoyance, discomfort, or loss in visual performance and visibility.

5. *Glint*: Light that is reflected at an angle from a surface or light that gives off a reflection in brilliant flashes.

In the Project vicinity, the current nighttime views of the sky are of high quality. The only existing fixed light sources are found at the California State Prisons south of I-10 at the Wiley's Well Road Exit and at the Wiley's Well Rest Area. Lighting levels are high at the two state prisons and nighttime sky glow from the prisons can be seen for several miles along I-10. Lighting levels at the Wiley's Well Rest Area are low and constrained to the immediate area of the comfort station building and parking area. There are no interchange lights at any of the following I-10 interchanges in the Project vicinity: Corn Springs, Ford Dry Lake, or Wiley's Well. Other than these two fixed sources of nighttime light (California State Prisons and Wiley's Well Rest Area) there are no existing street lights or yard lights within the Project vicinity that produce fixed nighttime light sources. Transitory nighttime light and glare is produced by headlights from moving vehicles on I-10. Otherwise, the area is generally very dark after sunset.

**Operational Lighting.** GSEP operations would require onsite nighttime lighting for safety and security. The GSEP would be in an area with very few existing structures, and the use of uncontrolled or excessive lighting could be noticed by nearby motorists or users of the Wiley's Well Rest Area. The affected viewers would more likely be distracted by light sources from traffic on I-10, the rest area or the prison complex south of I-10, than the operational lighting needed for the GSEP. Nevertheless, as described in Mitigation Measure VIS-2, to reduce offsite lighting impacts, lighting at the facility would be restricted to areas required for safety, security, and operation. Exterior lights would be hooded, and lights would be directed on site so that light or glare would be minimized. This would prevent facility lighting from being directed upwards such that the night sky would be affected. Low-pressure sodium lamps and fixtures of a non-glare type would be specified. Switched lighting would be provided for areas where continuous lighting would not be required for normal operation, safety, or security. The implementation of these measures would minimize the amount of lighting potentially visible off site. While these measures would not totally eliminate the light visible by surrounding user groups, facility lighting would be minimized and controlled such that it would not be a nuisance and would not detract from the ability for affected viewers to enjoy their surroundings.

**Glare from Parabolic Mirrors.** The large fields of parabolic mirrors could produce glint[4] and glare[5] at various times of the day. Potentially affected receptors would be travelers along I-10 and nearby local roads; users of the Wiley's Well Rest Area; and low numbers of dispersed recreational users in the vicinity. It is possible that the back reflected light or light not absorbed by both the envelope and steel annulus of the Heat Collecting Element (HCE) could produce glare, particularly when the viewer is positioned in line with the sun. This glare is more apparent as the viewer increases in distance and elevation relative to the GSEP. This glare could occur in any one place for several hours (e.g. a sunny afternoon) and would be similar in brightness and reflectivity as a water body or lake. At the time of moving into or out of stow position; the troughs also have the potential to produce glint, which is the product of spread reflection of the direct image of the sun. This glint would be much more intense than the glare produced by diffused reflections, but would be momentary, and limited to periods shortly after dusk and

4 A flash of light, also known as a specular reflection, produced as a direct reflection of the sun in the parabolic mirror surface.

5 A continuous source of excessive brightness, relative to ambient lighting, also known as diffused reflections.

shortly before dawn. During such periods, the bright spot would move as the observer changes position relative to the sun and mirror, with the result that the bright spot appears to "follow" the observer.

**Figure 4.18-4** provides examples of solar trough spread glare from the Nevada Solar One and the Kramer Junction SEGS projects, which are smaller in scale than the proposed GSEP, but provides examples of spread reflections of the sun that could occur momentarily, as trough systems rotate from stow position to tracking position in the morning and the reverse in the evening. These photographs provide examples of glare that may occur at close viewing distances unlikely to be experienced by the public in the case of the GSEP. The closest part of I-10 to the GESP is just under three miles, and the level of glare apparent in the example photographs would likely be diminished in intensity than if viewed from up close, and would occupy a significantly smaller portion of the view.

While affected observers would not experience the glare effects of the solar arrays for extended periods, it would likely be more intense than any other glint or glare in the observer's perspective. The GSEP would be visible to a motorist traveling along I-10 for approximately 20 miles (about 15-20 minutes at highway speeds). During most of this time, the site would be within background views, but would come within far middle-ground views briefly in the vicinity of KOP-1. Glint from the solar arrays could be distracting or nuisance-causing, even from locations relatively distant from the GSEP. Glare produced by diffuse reflections would increase the visual contrast of the GSEP in the landscape, but would not be quite as intense or distracting. Because the design and operation of the solar arrays is integral to generating power for the GSEP, the face of the parabolic mirrors cannot be color treated or dulled.

Several measures are available that would reduce the potential for and frequency of intense or distracting glare from the solar fields. Mitigation Measure VIS-4 would require slatted perimeter fencing around the perimeter of the site. Based on the relative difference in elevation between the GSEP and likely viewers along I-10 and at Wiley's Well Rest Area, this measure would prevent bright spot reflections for the majority of affected viewers. Mitigation Measures VIS-1 and BLM-VIS-1 would ensure that reflective surfaces be painted or treated so long as it would not impair proper function of the equipment or structure. This would include treating the backs of parabolic mirrors with non-reflective paint compatible with surrounding landscape colors.

These mitigation measures would reduce bright spot reflection associated with moving in and out of stow position, as well as the extent of reflective surfaces within the solar fields. However, the mitigation measures cannot prevent or reduce spread reflection off the face of the parabolic mirrors when out of stow position, especially for dispersed recreational users in the surrounding mountains. The contribution of glint and glare will be considered in the contrast discussion of each KOP below.

**Glare from Power Block Buildings, Administrative Buildings, and Transmission Lines.** Potential glare from power block facilities and the high-voltage transmission lines would be less intense and distracting, and can be reduced by applying mitigation measure VIS-1, and BLM-VIS-1. This would require that transmission lines be finished with non-specular and non-

reflective material, and the insulators to be non-reflective and non-refractive. Building and structure paints and finishes would be selected to blend with the landscape. These measures would prevent glare or reduce glare to minimal levels that would not be noticeable to potential viewers.

### Visible Vapor Plumes

The GSEP would include cooling towers that could emit visible vapor plumes with potentially adverse visual affects for surrounding viewers. The two meteorological factors that are most significant in determining the potential for vapor plume formation are the ambient temperature and the relative humidity. Given the dry, desert location, relative humidity tends to be low and ambient temperature warm during the daytime hours. Consequently, any visible vapor plumes will tend to form during periods with lower temperatures and high humidity such as during periods of winter precipitation. Thus, it is expected that the visual impacts of vapor plumes from the Project will be limited and concentrated during periods of inclement weather when the ambient conditions already will likely be contributing to reduced visibility.

Visible plumes that occur during daylight hours have the potential for producing an impact on visual resources. The Project's cooling tower is a potential source of visible water vapor plumes. Based on a conservative analysis of potential visible vapor plumes from the wet cooling towers, it is estimated that visible water vapor plumes from the GSEP would occur during 10.75 percent of seasonal daylight clear hours. However, based on other analyses done on similar solar energy projects, the approximate facility size of over 1800 acres, and the location of the cooling tower in the power block in the center of the site, the daytime cooling tower plume length is not expected to extend beyond the site boundaries in any case. Thus, the contribution of vapor plumes to the visual contrast of the GSEP would be minor.

### Visual Contrast Ratings

To analyze the visual contrast in the landscape created by the GSEP, the proposed action is simulated in photographs of the area for each of the KOPs described in Section 4.18.1. Figures 4.18-5 through 4.18-7 present both the existing and simulated conditions at each of the three KOPs. Further, Figure 4.18-8 presents an elevated simulation of the GSEP project, not as a KOP (since the perspective would not be experienced by common viewers), but as an example of how scale and dominance increase along with elevation differences and increased view angles. Conclusions on the visual contrast of the GSEP presented below do not take into consideration the nighttime contrast (lighting), which are discussed above, but do consider the contribution of glint and glare. Documentation of the visual contrast ratings (BLM Form 8400-4, Visual Contrast Rating Worksheet) is included in Appendix F.

**KOP-1 – Ford Dry Lake Bridge Over I-10.** KOP-1 represents the view from Ford Dry Lake Bridge over I-10, and represents the closest viewing distance from the highway to the project site (Figures 4.18-5A and 4.18-5B). Use of the local road is low, and views from I-10 itself would be comparatively less elevated. The GSEP is approximately 3.2 to 4.9 miles north of this camera position. The BLM uses a distance of 3-5 miles as a general rule of thumb for defining a foreground/middleground distance zone. However, the outer boundary of the foreground/

middleground zone is more precisely defined as the point where the texture and form of individual plants are no longer apparent in the landscape (BLM Manual H-8410-1). As seen in Figure 4.18-5B, in the context of the flat desert floor, the GSEP would be more appropriately characterized as being either on the outer fringe of the middleground zone, or in the background distance zone.

The distance and the low angle of view greatly diminish the dominance and scale of the GSEP in views of the landscape. This is due to perspective foreshortening, which reduces the apparent size of surfaces of areas or objects, when seen obliquely or at low viewing angles. Further, the line contrast created by the GSEP is moderate because it is nearly coincident with the flat horizon line of the valley floor or with the edge line created by the outer fringe of the Ford Dry Lake. From the vantage point in Figure 4.18-5B, the GSEP could appear as a distant lake, which would be out of character with the desert landscape, but would not necessarily detract from scenic quality. The form, texture, line and color of the solar fields are in weak contrast to the characteristic of the surrounding landforms and vegetation, due primarily to the narrow profile of the GSEP. The largest vertical element in the Project would be the administration building and warehouse (one building). Because of its size and relative position on the south side of the site, this building attracts some attention as seen from KOP-1. However, because this building would be painted a color sympathetic to the surrounding desert environment, as evaluated in the field with a BLM Color Chart (see Mitigation Measure VIS-1, AND BLM-VIS-1), the color contrast would be reduced, thereby also decreasing the contrast in form and line. The power block of Unit 1 is farther away from KOP-1 and does not attract attention.

The GSEP, as seen from KOP-1, would result in a weak visual contrast in form, texture, line and color. The dominant landscape composition is of a panoramic desert landscape punctuated by prominent mountains in the background. The GSEP does not significantly detract from this landscape composition due to the low angle of view, and would not attract the attention of the casual observer, except during times when the solar arrays generate substantial glint (bright spot reflection). The simulation for this KOP demonstrates a minor adverse affect on visual resources, and conformance with Interim VRM Class III Interim VRM objectives.

However, at times when the solar fields generate glint or glare, the GSEP would be a major focus of viewer attention, and would not conform to Interim VRM Class III objectives. Although the GSEP would be narrow, it would occupy a wide horizontal area in the landscape. Any glint from the GSEP would begin to dominate the general landscape character and would result in a momentarily strong visual contrast in the landscape. The visual contrast created by the GSEP shall be reduced by applying Mitigation Measures VIS-1, BLM-VIS-1, and VIS-4. These mitigation measures would reduce bright spot reflections and general glare effects through color treatment and installation of a slatted perimeter fence. The slatted perimeter fence would reduce bright spot reflections for motorists along I-10 in the vicinity of KOP-1, resulting in conformance with Interim VRM Class III objectives, even during times of glint and glare.

**KOP-2 – Wiley's Well Bridge Over I-10.** KOP-2 represents the view on the bridge over I-10 at the Wiley's Well Road Exit (Figures 4.18-6A and 4.18-6B). The affected viewers would be motorists on I-10, users of the Wiley's Road Rest Area, and low numbers of motorists accessing

the Mule Mountains LTVA via Wiley Well Road. The Project site is approximately 8.4 to 12.5 miles northwest of this camera position, making this a background viewing distance. The elevated camera position on the bridge provides a panoramic view of the flat desert plain that is constrained by the mountainous backdrop. Most viewing locations in the vicinity would be at lower elevations and thus this elevated viewpoint is where the project would be most exposed. It is likely that the GSEP would be even less visible from the rest area or interstate.

At this location, the analysis of visual contrast for the design elements of form, line, color, and texture is similar as described above for KOP-1. Only the viewing distance has increased further, and thus the general visibility of the project has decreased, as well as the apparent portion of the view affected. The elements of form, line, color, and texture of the existing natural landscape are not degraded by the Project. The administration building and warehouse is seen, but is barely visible in the simulation, thereby providing weak visual contrast. The Project would not create moderate or strong visual contrasts, but rather would create weak visual contrasts as seen from KOP-2. Thus, the simulation for this KOP demonstrates a minor adverse affect on visual resources, and conformance with Class III Interim VRM objectives.

However, at times when the solar fields generate glint, the GSEP would momentarily have a moderate visual contrast in the landscape. Even though the portion of view that the GSEP would occupy is narrow and in the background, it would begin to attract attention if glint is observed. A moderate visual contrast would still conform to Interim VRM Class III objectives. Mitigation Measures VIS-1, BLM-VIS-1, and VIS-4 would help reduce bright spot reflections and general glare effects through color treatment. However, from this distance and elevation, a slatted perimeter fence may not be able to shield possible momentary bright spot reflections. From this KOP, implementation of these mitigation measures would not appreciably reduce the visual contrast of the GSEP in the landscape, and the visual effect would be moderate during momentary periods of glint.

**KOP-3 – Corn Springs BLM Road.** KOP-3 represents the view on Corn Springs Road, south of I-10 (Figures 4.18-7A and 4.18-7B). The affected viewers would consist of low numbers of dispersed recreational users accessing a trailhead in the Chuckwalla Wilderness and the Corn Springs Campground. The Project site is approximately 9.0 to 14.25 miles east of this camera position, making this a background viewing distance. While low in number, these viewers would be fairly sensitive to changes in the landscape.

At this location, the analysis of visual contrast for the design elements of form, line, color, and texture is similar as described above for KOP-2, but the magnitude of contrast is further diminished by the decrease in the apparent size and scale of the GSEP within the scene. The elevated camera position on the fluvial plain at the lower slopes of the Chuckwalla Mountains provides a panoramic view of the flat desert plain that is only constrained by the mountainous backdrop of the Palen and McCoy Mountains. At this distance, the solar fields appear like a small water body or lake, and are visible but would not be noticed by casual observers of the landscape. Even viewers that are sensitive to changes in the landscape may notice the visual change, but are unlikely to find it visually distracting. From this KOP, the project would not attract attention and

would be in conformance with Interim VRM Class III objectives (and would even meet VRM Class II objectives), thus resulting in a minor affect on visual resources.

However, at times when the solar fields generate glint, the GSEP would momentarily have a moderate visual contrast in the landscape. Even though the portion of view that the GSEP would occupy is small, it would begin to attract attention if glint is observed. A moderate visual contrast would still conform to Interim VRM Class III objectives. Mitigation Measures VIS-1, BLM-VIS-1, and VIS-4 would help reduce bright spot reflections and general glare effects through color treatment. However, from this distance and elevation, a slatted perimeter fence may not be able to shield possible momentary bright spot reflections. From this KOP, implementation of these mitigation measures would not appreciably reduce the visual contrast of the GSEP in the landscape, and the visual effect would be moderate during momentary periods of glint.

**Elevated Views and Designated Wilderness**. As discussed in Section 3.19, the Palen- McCoy Wilderness is immediately north of the GSEP, but the area with views of the project is seldom visited and features neither trails nor trailheads. Nevertheless, because the wilderness area is physically accessible, it may be visited on rare occasions by backcountry hikers. Due to the size and scale of the GSEP, any increase in elevation or angle of view substantially increases the prominence of the project within views of the valley floor, as demonstrated in Figure 4.18-8. The perspective is not intended to be a realistic view that would be experienced by the public, but to demonstrate the importance of elevation differences, distance, and angle of view in the prominence and apparent scale of the GSEP in the desert landscape.

This shows what may be intuitively obvious—that the rare recreational user in the mountains of the Palen-McCoy Wilderness is likely to observe a greater degree of visual contrast within the landscape compared to the views presented in KOPs 1 through 3 above. However, because of the low level of use, higher elevation areas of the Palen-McCoy Wilderness does not warrant establishment of a KOP. Further, while the visual contrast created by the GSEP in the landscape would be greater than viewpoints in the valley, the available views would be panoramic and unencumbered, resulting in a lesser ability for large-scale visual changes to dominate the scene. For these reasons, the GSEP is judged to have a moderate adverse impact on visual resources for the low number of dispersed recreational users in the Palen-McCoy Wilderness. Several mitigation strategies are available to aid in reducing the moderate adverse effects, including BLM-VIS-1 and VIS-1 through VIS-6, but they cannot feasibly eliminate the scale and contrast created by the GSEP with respect to the design elements of line, color and texture. For this reason the visual impact remains moderate for the rare visitors to the Palen-McCoy Wilderness, except when the GSEP generates glint or strong glare.

During periods glint or strong glare (most likely shortly after dusk and before dawn), the visual contrast would be strong, because the GSEP would attract attention and may potentially be distracting from scenic overlooks (e.g. ridges, mountaintops). This effect would temporarily cause non-compliance with Interim VRM Class III objectives. Mitigation Measures VIS-1, BLM-VIS-1, and VIS-4 would help reduce bright spot reflections and general glare effects through color treatment. However, from this distance and elevation, a slatted perimeter fence would not be able to shield possible momentary bright spot reflections. From elevated viewpoints in the

wilderness, implementation of these mitigation measures would minimally reduce the visual contrast of the GSEP in the landscape, and the visual effect would remain strong during momentary periods of glint, and would still be in non-conformance with Interim VRM Class III objectives.

The Mule Mountains Wilderness, the Chuckwalla Wilderness, Little Chuckwalla Mountains Wilderness, and the Palo Verde Mountains Wilderness south of I-10 could also have views of the project site (see Figure 3.19-3). The level of dispersed recreational use of these mountains is higher due to the presence of the Coon Hollow, Wiley Well, and Corn Springs Campgrounds, as well as the Bradshaw Trail (see Section 4.12 – Impacts to Recreation). The nature of visual impacts would be similar as described above for the Palen-McCoy Wilderness, except that elevated views from these wilderness areas are located far enough away that the GSEP would have a weak contrast in views towards the Chuckwalla Valley and would represent an small and narrow portion of the view, if visible at all. During times of glint and glare, the visual contrast would be increased to moderate, but would still be in conformance with Class III objectives.

**Transmission Lines**. The GSEP includes a gen-tie line that would be routed in a southeasterly ROW eventually connecting to the Southern California Edison (SCE) 500-230 kV Colorado River substation via the existing Blythe Energy Project Transmission Line (BEPTL) between the Julian Hind and Buck substations. This transmission line would 75 feet high, and would be in close proximity to and cross I-10 in the vicinity of the Wiley Well Road interchange. As shown in Figure 3.19-2, the area surrounding the Wiley Road interchange with I-10 contains numerous cultural modifications, such as highway signs, existing transmission lines, and a utility tower. As such, the landscape character is currently characterized by a moderate amount of visual clutter that is visually discordant with the surrounding landscape.

While no KOP was prepared for the transmission line feature of the GSEP, Figure 4.18-9 presents a visual simulation for the Blythe Solar Power Project transmission line (taller, about 140 feet), located along I-10 approximately 9 miles to the east. The scenic quality rating unit as described in Section 3.19 is the same, although fewer cultural modifications are apparent in the simulation of the Blythe Solar Power Project transmission line. As evident in the simulation, the transmission line is would add industrial features with prominent vertical and curvilinear lines to the foreground landscape. Although the strong vertical lines of the steel poles would contrast with the prevailing horizontal lines of the mesa and the irregular ridgelines of the mountains beyond, nearby transmission line structures do exhibit similar linear characteristics, though at a smaller and less noticeable scale. The resulting visual contrast caused by these industrial characteristics and contrasting features would be moderate, because it would be only briefly experienced by motorists as the power line comes into foreground views along the highway.

The high voltage power line has a moderate contrast, and is quite prominent in the view, and thus may attract the attention of some highway travelers. However, because I-10 is a utility corridor, is paralleled by an existing transmission line, and contains scattered structures shown in Figure 3.19-2, it is unlikely that the casual observer would pay particular attention to the structure. Further, the foreground view of the transmission line in the highway setting would not significantly alter the character of the landscape. For these reasons, the GSEP transmission line, expected to be similar in

appearance and setting as the simulation in Figure 4.18-9, would be in conformance with Class III objectives, which allows for moderate visual contrast.

However, because of the proximity to the highway and the large number of motorists that would be exposed to foreground views of the transmission line, Mitigation Measures VIS-1 and VIS 3 are proposed to help reduce the contrast created by the transmission poles. These mitigation measures would require the applicant to set back the transmission line at least 1/2 mile from Highway I-10. In addition, to reduce contrast and prominence of the transmission line, lattice-style transmission towers shall be utilized, and painted in non-reflective natural tones to blend with the visual background. Re-alignment of the transmission line shall be consistent with any cultural or biological constraints identified in the applicable portions of this DEIS. In the event of conflict, cultural or biological constraints shall prevail.

### *Decommissioning*

The purpose of decommissioning is to remove GSEP-related structures and infrastructure so that affected lands could naturalize. However, until vegetative restoration is achieved as required in Mitigation Measure BIO-23 and BIO-24, adverse visual impacts would be similar to those described in the operation-phase impacts, because large areas would be devoid of desert scrub vegetation. Visual effects from the proposed transmission lines would be likely to remain, however, since it seems likely that, once in use, such lines would remain in use regardless of whether the energy they transfer is generated by the BSPP or another project. Because the solar fields would be dismantled, the effects of glint and glare would be eliminated, and thus the general visual contrast of the project area would range from weak to moderate depending on the viewpoint, resulting in conformance with Interim VRM Class III objectives even without mitigation. The impacts of decommissioning would be somewhat reduced in intensity, however, as compared to construction, because the contrast in color created by the power block structures and solar arrays would be removed. The contrast in the design elements of form and line would remain. Disturbed areas would be revegetated according to Mitigation Measure BIO-23, BIO-24, as well as VIS-6. Mitigation Measure BIO-24 includes a performance standard that the coverage and species composition of the restored areas be the same as that which naturally occurs in the adjacent desert scrub or dune habitats. Further, Mitigation Measure VIS-6 requires that temporarily disturbed areas be recovered with soil, brush, rocks, and natural debris. This would reduce the contrast of temporarily disturbed areas until vegetative restoration is achieved.

## Alternatives

### *Reduced Acreage Alternative*

The degree to which visual impacts are reduced due to the reduced acreage alternative depends on the viewing location. From I-10, as shown in the simulations for KOP 1 and 2 (Figures 4.18-5 and 4.18-6), the length of the middleground/background zone occupied by the GSEP would be reduced by up to half. This effect would be less apparent from KOP 2 because most of the visual changes in the view are due to power block 1, whereas, from KOP 1, the visual changes are equally due to power block 1 and power block 2. From the perspective of KOP-3, the effect

would be minor because the project is so minimally visible. From elevated viewpoints, the area occupied by the GSEP would be reduced, thereby reducing the size and scale of the project; however, the degree of visual contrast created in the landscape, in terms of color, line and texture, would remain the same. Thus, the conclusions on visual contrast for the reduced acreage alternatives would generally be similar, albeit somewhat less intense than the proposed action.

### *Dry Cooling Alternative*

The dry cooling alternative would contain a dry cooling tower for each power block that would exceed the height of any other building, and could be as high as 120 feet. Otherwise, the visual appearance of the project would remain similar as that analyzed under the proposed action. From viewpoints close to the GSEP, such as KOP-1, this increase in height may be noticeable, but further away as the GSEP becomes part of background views; the addition of a taller structure is unlikely to be noticed due to significant perspective foreshortening. From KOP-1 the dry cooling alternative would result in a minor increase in the visual contrast determined under the proposed action. It could slightly increase the contrast in form and line within the existing landscape. However, Mitigation Measure VIS-1 AND BLM-VIS-1 would equally be able to reduce the effect by painting the exterior with colors compatible with the landscape, which would reduce both color and line contrast. The conclusions on visual contrast for the dry cooling alternatives would generally be similar, albeit slightly greater in intensity than the proposed action.

### *No Action Alternative A*

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, none of the construction- or operation-related visual resources impacts from the proposed action would occur.

### *No Project Alternative B*

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the visual resources of the site would not be expected to change noticeably from existing conditions and, as such, No Project Alternative B would not result in visual resources impacts.

### *No Project Alternative C*

Under No Project Alternative C, future solar energy development could be expected to affect visual resources to the same degree and extent as referenced in the proposed action. For example, if the acreage of the solar energy developed is 50 percent less than the proposed action, then impacts to visual resources would be 50 percent less intense. As discussed in the reduced acreage alternative, the degree of change in impact intensity would vary based on location and geometry chosen.

## 4.18.3 Discussion of Cumulative Impacts

Impacts resulting from construction, operation, maintenance and decommissioning of the GSEP could result in a cumulative effect on visual resources with other past, present, or reasonably foreseeable future actions. The geographic scope of the cumulative effects analysis for visual resources consists of the I-10 corridor (where visual impacts could be synergistic), and locations from which a viewer could see the proposed action along with views of other projects (where visual impacts could be additive). This geographic scope of cumulative impacts analysis was established based on the natural boundaries of the affected resource, i.e., potential shared viewsheds, and not on jurisdictional boundaries. Potential cumulative effects on visual resources could occur during the GSEP's proposed 39-month construction period (e.g., from cumulative construction disturbances), during the projected 30-40 year lifespan of the proposed action (e.g., project contrast with the landscape, glint and glare), or result from closure and decommissioning (e.g., until restoration efforts return the landscape to its original condition).

Existing conditions within the area of cumulative effects analysis reflect a combination of the natural condition and the effects of past actions and are described in FEIS Chapter 3. Direct and indirect effects of the GSEP are analyzed above. Past, present and reasonably foreseeable future actions making up the cumulative scenario are identified in Section 4.1. Among them, projects such as the Chuckwalla Valley Raceway, the Blythe, Rice, Palen and Desert Sunlight solar power projects are expected to result in synergistic visual impacts for travelers along I-10, as well as visual impacts to dispersed recreational users in the surrounding mountains.

### Motorists on I-10

Visual changes as a result of other projects in the cumulative scenario would not be within the line of sight for travelers along I-10 viewing the GSEP. However, the combined effect of large-scale landscape alterations that would be visible along the length of I-10 within the CDCA Plan area could substantially degrade the visual character and the general scenic appeal of the landscape.

Numerous existing cultural modifications are visible from the I-10 corridor, including transmission lines, pipelines, 4-wheel drive tracks, and widely scattered facilities and structures; however, the general character is of an unimpaired, isolated desert landscape. The cumulative scenario includes many large-scale solar plants whose scale, potential glare, and pervasiveness would have adverse cumulative effects. If all the cumulative projects included in Section 4.1 were to be implemented (which is considered unlikely), they would convert about 123,592 acres along the I-10 corridor between roughly Desert Center and Blythe (approximately 50 miles) from an undeveloped desert viewshed to a more industrialized appearance (mostly with large solar array fields using both thermal and photovoltaic technologies).

In many cases, the apparent scale of the projects from motorists' perspective would be diminished greatly by favorable topographic relationships. The cumulative projects are at the same or similar elevation as the highway, and are reduced in prominence due to their distance from the highway and low angle of view. In many cases, the other projects in the cumulative scenario would blend

in with the horizon line of the valley floor, and the rugged mountains would remain the dominant visual features in the landscape. In spite of this, because the landscape is currently undeveloped and valued by visitors for its isolated and unspoiled condition, the addition of numerous new large-scale solar projects would substantially degrade the scenic experience for many travelers along I-10, due to the projects' industrial character and visual contrast. Mitigation measures are available that reduce the color contrast of structures, or the line contrast of vegetation clearing; but the measures reduce the contrast of certain features of the projects at various distances. No mitigation measure is available that would be sufficient to address features of the project that result in the most contrast in the landscape: the large-scale, color, glare and reflectivity of the GSEP's solar fields. Thus, the cumulative scenario would present an *unavoidable and adverse* impact for travelers along I-10.

## Dispersed Recreational Users in Surrounding Mountains

Dispersed recreational users in the Palen-McCoy Wilderness, and other mountains surrounding the GSEP—due to their elevated position and access to unencumbered, panoramic views of the valley below—could experience both additive and synergistic impacts in the cumulative scenario. The GSEP, along with other projects in the cumulative scenario, would not result in direct visual alteration to BLM wilderness areas; but the scale and contrast created by numerous renewable energy projects would greatly alter views of the valley floor experienced by wilderness users. Existing cultural modifications on the valley floor are largely limited to linear alignments (e.g., roads and transmission lines), or other structures that are diminished in importance due to the considerable distance from which they are viewed. However, the cumulative scenario presents numerous large-scale renewable energy projects that would be readily apparent to most wilderness users. The GSEP, in combination with other projects, would make the valleys surrounding the Palen-McCoy Mountains Wilderness appear increasingly industrialized, and could substantially diminish the remote and isolated character of the landscape. While use levels in the mountains and wilderness surrounding the GSEP are generally low, the remote and isolated character of the landscape is highly valued by its users, and likely represents the primary attraction. Large scale visual alterations to the valley floor would substantially impair the ability of a small, but highly sensitive viewer group to enjoy their surroundings.

Available mitigation measures could not feasibly reduce the scale and contrast created by the projects in the cumulative scenario, especially from elevated viewpoints. Thus, the cumulative scenario presents an unavoidable and adverse impact for dispersed recreational users in surrounding, higher-elevation wilderness areas.

## Alternatives

Cumulative impacts would vary by alternative to the GSEP only to the degree to which direct and indirect impacts would vary by alternative.

## 4.18.4 Summary of Mitigation Measures

The implementation of mitigation measures imposed by the Energy Commission as Conditions of Certification for the GSEP also would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G. The following address impacts on visual resources.

VIS-1, BLM-VIS-1, VIS-2, VIS-3, VIS-4, VIS-5, VIS-6, AQ-SC3, AQ-SC4, BIO-24

In addition, the following mitigation measure would be imposed by the BLM to avoid or reduce impacts on the quality of the human environment. The following mitigation measures would avoid or minimize impacts on visual resources:

**BLM-VIS-1:** The project owner shall paint power block structures and other vertical construction colors sympathetic to the surrounding desert environment, such as covert green. The appropriate color shall be evaluated and determined in the field using a BLM Color Chart. The backs of solar troughs shall also be color treated to minimize color contrasts.

## 4.18.5 Residual Impacts after Mitigation Measures were Implemented

Residual impacts of the GSEP after implementation of mitigation measures would come from effects on the size and scale of the project. While mitigation measures BLM-VIS-1, and VIS-1 through VIS-6 are helpful in reducing the level of contrast in form, line, color and texture for individual project features; the ability of these measures to reduce visual impacts decreases as the size and scale of the project in views increases. Thus, very few of the identified impacts are altogether eliminated through application of the proposed measures; however, the contrast in glare, color and texture would be substantially reduced from all of the KOPs, with application of BLM-VIS-1 and VIS-1. Further, the impact of lighting and reflected glare, while not eliminated, also would be reduced substantially by implementation of BLM-VIS-1, VIS-3 and VIS-4. However, as the angle of view increases, the size and scale of the GSEP solar arrays would become the dominant contrasting factor because the surface of the parabolic mirrors could not be treated or painted to blend in with the landscape.

## 4.18.6 Unavoidable Adverse Impacts

The GSEP would cause one long-term substantial adverse impact that cannot be mitigated: adverse cumulative impacts for travelers along I-10 and dispersed recreational users in the Palen-McCoy Wilderness and other surrounding mountains. When viewers experience glint or bright spot reflections, the impact would be temporarily adverse and unavoidable from KOPs 2 and 3, as well as the rare dispersed recreational user in the Palen-McCoy Mountains.

# 4.19 Impacts on Water Resources

## 4.19.1 Impact Assessment Methodology

This analysis is based on available information and data that has been provided in support of the Application for Certification (AFC), Supplement to the AFC, the Staff Assessment and Draft Environmental Impact Statement, and the Revised Staff Assessment, which were all prepared in support of the proposed action for compliance with state and federal regulations. Technical reports and studies associated with these documents were also reviewed and considered in the preparation of this analysis. The assessment methodology reviews potential direct and indirect impacts that could result from implementation of the proposed action, and reviews mitigation measures that would be applied in order to minimize potential impacts.

## 4.19.2 Discussion of Direct and Indirect Impacts

### Construction and Operations

The GSEP has proposed to utilize underlying groundwater to supply GSEP water needs during construction. There is a concern that the water demand of the GSEP would exceed the groundwater basin budget and lead to overdraft conditions.

A comparison was made between the average annual basin budget with the anticipated GSEP water production requirements. **Table 4.19-1** presents the anticipated GSEP's water requirements along with the average annual basin budget for the 39-month construction period. Currently, the Chuckwalla Valley Groundwater Basin (CVGB) balance is positive by approximately 2,608 ac-ft/yr whereby inflow (approximately 13,719 ac-ft/yr) is slightly greater than estimated outflows (approximately 11,111 ac-ft/yr). Approximately 1,200 ac-ft/yr of the outflow is attributed to outflow to the adjacent Palo Verde Mesa Groundwater Basin (PVMGB) and the Colorado River System.

**TABLE 4.19-1**
**ESTIMATED CHANGE TO CHUCKWALLA VALLEY GROUNDWATER BASIN BUDGET**
**(AVERAGE YEAR CONDITIONS)**

| GSEP Component | Years | Annual Basin Budget Balance | GSEP Requirements (ac-ft/yr) | Net Budget Balance (ac-ft/yr) |
|---|---|---|---|---|
| Construction | 1 | 2,608 | 1,368 | 1,240 |
| | 2 | 2,608 | 616 | 1,992 |
| | 3 | 2,608 | 616 | 1,992 |
| Operations | 4-33 | 2,608 | 1,644 | 964 |

It is anticipated that groundwater extraction during construction (~616 to 1,368 ac-ft/yr) and operation (~1,644 ac-ft/yr) would not impact the CVGB balance as the 1,368 ac-ft/yr during construction and the 1,644 ac-ft/yr during operations would not exceed the positive yearly balance of 2,608 ac-ft/yr.

The GSEP's pumping could also have an effect on the PVMGB by reducing or eliminating outflow to that basin or even inducing inflow from the Colorado River. Given the location of the GSEP and the anticipated annual GSEP water requirements, the GSEP would impact the PVMGB and the Colorado River Basin. We note that water use in the CVGB may be governed by the U.S Bureau of Reclamation (USBR), which could require the GSEP to acquire an allotment of water from the Colorado River, and/or require other actions to mitigate potential reductions to the Colorado River System. Herein, the Colorado River Basin is defined under the Colorado River Compact of 1922 (affirmed by 547 U.S. 150 [2006]) as, "…all of the drainage area of the Colorado River System," where the term "Colorado River System" is defined as the Colorado River and its tributaries. . Finally, tributaries to the Colorado River were defined as, "all stream systems the waters of which naturally drain into the mainstem of the Colorado River below Lee Ferry." For additional discussion of issues associated with the Colorado River, in regards to groundwater pumping and use by the GSEP, please refer to **Chapter 3.20**.

Water in the Colorado River Basin is fully appropriated. According to the Consolidated Decree of the Supreme Court of the United States in the case of *Arizona v. California, et al*. entered Match 27, 2006, (547 U.S. 150 (2006)), "Consumptive use from the mainstream within a State shall include all consumptive uses of water of the mainstream, including water drawn from the mainstream by underground pumping." The mainstream was indicated as "the mainstream of the Colorado River downstream from Lee Ferry within the United States, including the reservoirs thereon." The Supreme Court Decree went on to state that the State of California is enjoined "from diverting or purporting to authorize the diversion of water from the mainstream the diversion of which has not been authorized by the United States for use in the respective States; provided, however, that no party named in this Article and no other user of water in said States shall divert or purport to authorize the diversion of water from the mainstream the diversion of which has not been authorized by the United States for its particular use."

The U.S. Geological Survey has indicated that the CVGB lies within a basin tributary to the Colorado River and that wells drawing groundwater within those groundwater basins could be considered to be withdrawing water from the Colorado River Aquifer (Wilson et al., 1994). The USGS developed an accounting surface for determination of whether water was being drawn from the mainstream of the Colorado River. The accounting surface for the GSEP site ranged from 248 to 252 feet mean sea level (msl). Consequently, the GSEP has the potential to divert Colorado River water without any entitlement to the water, and all groundwater production at the site should be considered Colorado River water.

## Groundwater Levels

The GSEP has the potential to lower groundwater levels as a result of water production during both construction and operation. The lowering of groundwater levels could have an impact if the lowering of the groundwater levels: 1) impacts existing water wells in the basin, 2) reduces outflow to the PVMGB and the Colorado River Basin, 3) lowers the water table in areas where deep-rooted phreatophytes are prevalent (see Section 4.17 for impacts related to biological resources), 4) affects surface water features including springs, and/or 5) induces permanent ground subsidence.

Drawdown imposed by a well on another nearby pumping well can have adverse affects on the performance of that well and is referred to as interference drawdown or well interference. Specific potential adverse affects evaluated in this study include the following:

- Interference drawdown can result in the water level of an aquifer being drawn down below the screen of the well (i.e., the well goes dry);
- Interference drawdown can result in the water level of an aquifer being drawn down to a point where the affected well's capacity to pump water is decreased and the well can no longer produce the amount of water that is needed for a particular use, or the well and related equipment is at risk of becoming damaged and unusable over time due to exposure of the well's screen above the water table and resulting aeration;
- Interference drawdown can result in the water level in the affected well being drawn down to near the intake of the well's pump, requiring lowering of the pump intake in order for the well to remain operational;
- Interference drawdown can cause a decrease in groundwater level or water table in the affected well such that the well and pump can continue to operate and produce adequate amounts of water, but pumping must occur at either greater frequency or duration, and/or water must be lifted to a greater height, resulting in greater operational and maintenance costs; and/or
- Water quality in the affected well may be reduced if interference drawdown removes a layer of higher-quality water that overlays lower-quality water.

The extent and type of well interference experienced by an affected well is dependent on hydrogeologic conditions in the aquifer as well as the characteristics of the affected well. These include the following:

- The amount of interference drawdown that is applied (which varies with the distance of the impacted well from the GSEP well(s);
- The depth and screened interval of the affected well;
- The thickness of saturated sediments penetrated by the affected well;
- Local variations in the transmissivity of the saturated sediments in which the affected well is completed, if any;
- The condition and efficiency of the affected well;
- The affected well's pump specifications, including its rating curve, the depth at which the pump intake is set, and the resulting pumping water level in the well during operation; and
- The minimum required water production rate of the well.

Phreatophyte trees such as mesquite, ironwood or palo verde have deep root systems that can extend tens of feet below the ground surface to the underlying water table. In addition, wet playas can harbor halophyte plant communities that depend on a shallow water table for their moisture. Lowering of the water table below the root depth of these plants could result in stress or death. There is additional discussion of this issue in the Impacts on Vegetation Resources sections (Sections 3.18 and 4.17).

Ground subsidence can occur as a result of water level decline in aquifer systems. When the fluid pressure in an aquifer is reduced as a result of changes in the groundwater level, a shift in the balance of support for the overlying materials causes the "skeleton" of the aquifer system to deform slightly. Reversible deformation occurs in all aquifer systems as a result of the cyclical rise and fall of groundwater levels associated with short and longer term climatic cycles. Permanent ground subsidence can occur when pore water pressures in the aquifer fall below their lowest historical point, and the particles in the aquifer skeleton are permanently rearranged and compressed. Soils particularly susceptible to such consolidation and subsidence include compressible clays in a confined or semi-confined aquifer system. This type of deformation is most prevalent when confined alluvial aquifer systems are overdrafted.

### *Construction and Operation*

Preliminary investigations conducted at the GSEP site suggest that the aquifer proposed for development (the Bouse Formation) is under confined to semi-confined conditions and is separated in part from the shallow alluvial groundwater system by low permeability sediments. For purposes of analysis of impacts to water levels, a numerical model was developed by Worley-Parsons (WPAR, 2010) that separated the impacts between two water-bearing zones, the shallow alluvial zone (referred to as Layer 1), and the deeper Bouse Formation (referred to as Layer 11 and Layer 12). Correspondingly, impacts to these layers varied due to the assumption that the confining layers are laterally continuous and maintain hydraulic separation away from the proposed pumping wells. For additional discussion of relevant confining conditions, refer to Chapter 3.20, Water Resources. For additional detail regarding model parameters, assumptions, and modeling procedures, please refer to WPAR (2010).

The maximum predicted water table (Layer 1) drawdown associated with the GSEP is approximately 0.3 feet in the area of the pumping wells, and the area where drawdown exceeds 0.25 feet is limited to within approximately 2.5 to 3.5 miles of the GSEP wells (**Figure 4.19-1**) (WPAR, 2010). The maximum predicted drawdown in the Bouse Formation (Layer 12) associated with the GSEP is approximately 10 feet in the area of the pumping wells, and the area where drawdown exceeds 1 foot is limited to within approximately 7 to 10 miles of the GSEP wells (**Figure 4.19-2**). Recall that the Bouse formation is a confined to semi-confined aquifer. Changes in water table levels (e.g. in the upper aquifer) are shown in **Figure 4.19-1**.

Based on the general geology of the Chuckwalla Valley, the Riverside County General Plan Safety Element designates basin fill sediments in the valley as being susceptible to subsidence (Riverside County, 2008). . Although the applicant's supposition that no subsidence would be caused by the GSEP is based upon historical response of the CVGB to groundwater level declines that took place in the western portion of the basin and may not be applicable beneath the GSEP located in the eastern portion of CVGB, the potential for subsidence associated with the pumping of groundwater for the GSEP is considered low, based on well drilling data and other data concerning aquifer sediment composition.

The nearest potential wetland or halophyte communities would be near Palen Lake. BLM has identified an ironwood woodland community approximately 5 miles north of the GSEP site.

Predicted water table drawdowns beneath this woodland are in the range of 0.05 to 0.2 feet. Section 4.17 describes potential impacts to vegetation that may be dependent on shallow groundwater table conditions.

Given the current understanding of the hydrogeology of the Quaternary Alluvium, the Bouse Formation and the fanglomerate, as well as the current understanding concerning existing wells that may be affected by GSEP-induced drawdown, it is unlikely that groundwater pumping for the GSEP would cause any nearby wells to go dry or be severely impaired or rendered unusable by declining groundwater levels.

Groundwater levels near the GSEP's water supply wells would decline during the GSEP pumping. While preliminary studies and calculations have been made to assess the potential for local impact, the quantification of the impact is an estimate and would not be able to be accurately quantified until actual long-term groundwater production occurs.

## Groundwater Quality

There is a potential that groundwater quality impacts could occur during construction if contaminated or hazardous materials used during construction were to be released and migrate to the groundwater table. Given the proposed implementation of a hazardous material management plan during construction (Hazardous Materials Management section), no impact is expected.

There is a potential that GSEP extraction of groundwater may induce vertical flow of high saline groundwater from beneath Ford Dry Lake to lower aquifers being used for water production located beneath the site. Lateral transport of high TDS groundwater may occur as a result of the GSEP and the vertical transport of high saline groundwater downward may slightly increase TDS concentrations in some limited areas. Under State Water Resources Control Board (SWRCB) Resolution 88-63, the brackish water underlying the GSEP site that exceeds TDS concentrations of 3,000 mg/L or 250 mg/L chloride would not be considered a potential source of drinking water; and would be suitable only for potential industrial use.

The impact upon water quality due to GSEP pumping was completed by simulating transport of chloride in groundwater using the MT3D transport model. Groundwater velocity data output from the groundwater flow model impact assessment was utilized by the MT3D transport model for this assessment. Chloride was selected as the preferred solute, as it is conservative (e.g., does not undergo chemical reactions or attenuation) and is a dominant anion in groundwater in the GSEP area for which baseline analytical data is available for the lower aquifers being used for water production. In addition, chloride can be directly related to TDS concentration with a reasonable degree of accuracy. Chloride concentrations in groundwater in the eastern portion of the basin are approximately 38 percent of the TDS concentration. For additional details regarding modeling analysis, parameters, and assumptions, please refer to WPAR (2010a).

The water quality impact model was run for a period of 33 years to simulate the expected duration of GSEP operations, and the modeled concentrations of chloride in groundwater extracted from the well were recorded. Chloride in the model would migrate with the groundwater that is being extracted, and increases in chloride concentrations imply vertical or

lateral migration of high chloride, and hence high TDS groundwater into lower concentration areas, thus potentially degrading water quality (WPAR, 2010a).

During the 33-year pumping simulation, chloride concentrations in the shallow aquifer are projected to decrease slightly, from a baseline concentration of approximately 1,600 mg/L to approximately 1,470 mg/L at the end of the simulation. This is a decrease of approximately 8 percent and is likely due to the dilution of groundwater in the GSEP area by lower TDS groundwater drawn in from the north and east of the GSEP site.

Implementation of the mitigation measures listed at the end of this section is expected to minimize impacts to groundwater quality to low levels.

With regard to the operation of the Land Treatment Unit (LTU) on the GSEP site, the material that would be placed in the LTU consists of soil that is impacted with Therminol® VP1 HTF as a result of minor leaks or spills (Hazardous Materials Management Section) that occur during the course of daily operational or maintenance activities. The LTU would cover an area of approximately 600 feet by 725 feet, including the staging area, and would cater to both 125 MW units. The LTU would be constructed with a prepared base consisting of two feet of compacted, low permeability, lime treated material and be surrounded on all sides by a minimum two foot high compacted earthen berm with slopes of approximately 3:1 (horizontal:vertical) that would serve as a protective barrier to the downward movement of contaminants from the LTU.

At ambient temperatures, HTF is a highly viscous material (crystallizes at ~54°F) that is virtually insoluble in water (solubility of ~25 mg/L [WPAR, 2009]). The LTU would be surrounded on all four sides by berms that would protect the LTU from surface water flow. Because of the viscous and insoluble nature of HTF, it is not likely to mobilize from the soil downwards to the water table (approximately 70-90 feet bgs), and any contaminants that may escape the LTU are not expected to impact surface water or groundwater quality beneath the site. Compliance with the requirements of CCR Title 23, Division 3, Chapter 15; Title 27, Section 2000 et seq.; Title 23, Section 2510 et seq.; and mitigation measure **WATER-6** would minimize potential impacts to groundwater quality to below the level of significance.

In summary, because of the viscosity of HTF at ambient temperatures, the insolubility of HTF, the presence of a low-permeability layer lining the LTU, the depth of the water table, and the placement of protective berms around the LTU, it is expected that surface water and groundwater quality beneath the site would not be impacted by LTU operation.

Each 125 MW unit would have three double-lined evaporation ponds. Each pond would have a nominal surface area of eight acres resulting in a total of 24 acres of evaporation ponds for each unit or a total of 48 acres of ponds for both 125 MW units. The ponds would be designed and permitted as Class II Surface Impoundments in accordance with CRBWQCB requirements, as well as the requirements of the California Integrated Waste Management Board (CIWMB). Multiple ponds are planned to allow plant operations to continue in the event that a pond needs to be taken out of service for some reason, *e.g.*, needed maintenance. Each pond would have enough

surface area to allow the evaporation rate to exceed the cooling tower blowdown rate at maximum design conditions and annual average conditions.

The average pond depth would be eight feet, and residual precipitated solids would be removed approximately every seven years to maintain a solids-depth no greater than approximately three feet for operational and safety purposes. The precipitated solids would be sampled and analyzed to meet the characterization requirements of the receiving disposal facility. The characteristics of the precipitated solids would determine the transportation and disposal methodology. It is anticipated the pond solids and other non-hazardous wastes would be classified as Class II Designated Waste, a non-hazardous industrial waste, and thus could be shipped to a standard landfill for disposal. Genesis Solar, LLC would test the pond solids using appropriate test methods in advance of removal from the evaporation ponds to confirm this determination; however, preliminary data estimates show the material would be non-hazardous. Should pond residue be determined to be hazardous, it would be shipped to an appropriately certified landfill for disposal. Approximately 6,150 tons of evaporative residue would be accumulated yearly, which equates to approximately 50,000 tons of evaporative residue being removed during each cleanout and a total estimated amount of 214,500 tons over 30 years.

The pond liner system would consist of a 60 mil high density polyethylene (HDPE) primary liner and a secondary 40 mil HDPE liner. Between the liners would be a synthetic drainage geonet and collection piping to be used as part of the leachate collection and removal system (LCRS), which would be directed back to the pond. There would be a hard surface protective layer on top of the 60 mil HPDE which would consist of a non-woven geotextile, a one foot thick granular fill/free draining material, and a one foot thick hard surface such as roller-compacted concrete. The hard surface provides protection against accidental damage to the HDPE from falling objects, varying climatic conditions, and worker activities during cleanout and maintenance. Monitoring of the evaporation ponds would be required to detect the presence of liquid and/or constituents of concern. Based on the experience of the existing SEGS plants, it is expected the constituents of concern for this monitoring would include chloride, sodium, sulfate, TDS, biphenyl, diphenyl oxide, potassium, selenium, and phosphate. Due to the aforementioned construction and operational procedures of the surface impoundments along with mitigation measure **WATER-20**, groundwater quality is not anticipated to be affected as a result of disposal of this waste stream and impacts to groundwater quality would be below the level of significance. The ponds would be covered by netting, designed to exclude birds and other wildlife from drinking, foraging or landing on the water of the ponds.

Additional requirements for mitigation of potential groundwater quality impacts would also be included as a part of the waste discharge requirements for the surface impoundment that would be included in mitigation measure **WATER-6.**

The use and application of septic fields is an established practice as a method of wastewater treatment. The closest septic field to a privately owned parcel of land is in excess of ½ mile. The septic system would have no effect on the surface water in or around the GSEP site. The septic system would be installed approximately 5-6 feet deep. In addition, the Riverside County Department of Environmental Health has a Technical Guidance manual for Onsite Wastewater

Treatment Systems and this requires a setback of 100 feet between this type of system and the nearest groundwater well.

It is assumed that individual septic systems and leach fields are planned for each of the two power blocks in support of the GSEP's administrative, warehouse, and control room and facilities. The proposed septic systems and leach fields for the various facilities are hydraulically up-gradient approximately 3 miles from the nearest offsite well. Therefore, operation of the septic systems and leach fields from these areas is not expected to impact groundwater quality at the nearest offsite wells.

The septic system and leach fields for the GSEP would be constructed in accordance with the requirements of Riverside County:

1. Ordinance 650.5 (amending Ordinance 650, which regulates the discharge of sewage in unincorporated areas of the County of Riverside and incorporates by reference Ordinance 725),
2. Title 15 Section 15.24.010 (the Uniform Plumbing Code) Appendix K for Private Sewage Disposal – General and Disposal Fields, and
3. Title 8 Section 8.124.030 (Approval and Construction Permit for Sewage Discharge) and Section 8.124.050 (Operation Permit for Sewage Disposal).

**Table 4.19-2** lists septic system and leach field minimum setbacks as required by the County of Riverside and the GSEP setbacks for the GSEP site.

**TABLE 4.19-2**
**SANITARY FACILITY SET-BACKS REQUIREMENTS**

| County of Riverside Requirement | Minimum Set Back | GSEP Set Back | Reference |
|---|---|---|---|
| Minimum Distance Between Groundwater and Leach Lines | 5 feet | 175 feet | Riverside County Ordinance 650.5 (& OWTS Guidance Manual) |
| Minimum Horizontal Distance From Water Supply Wells | 50 feet | 250 feet | 2007 California Plumbing Code (adopted by Reference as Riverside County Title 15, Chapter 15) |

SOURCE: CEC, RSA (June 2010) Soil and Water Table 18.

Groundwater quality in the vicinity of the GSEP site could be impacted as a result of the operation of the LTU, surface impoundments and septic fields. Preliminary studies and calculations have been made to assess the potential for impact. These studies suggest that there is a low potential to impact groundwater quality in the vicinity of the GSEP site.

Implementation mitigation measures**WATER-5** through**WATER-7** and **WATER-20** are anticipated to minimize impacts below a level of significance. Additional requirements for mitigation of potential groundwater quality impacts would also be included as a part of the waste

discharge requirements for the LTU and surface impoundment that would be included in **WATER-6.**

## Surface Water Hydrology

The impacts of the GSEP on the local surface water hydrology are directly related to proposed onsite grading and the construction and operation of a network of engineered collector/conveyance channels designed for the purpose of protecting the GSEP from flooding. The GSEP would change both the extent and physical characteristics of the existing floodplain within the GSEP site and downstream of the GSEP site. A change in sediment transport and depositional characteristics at and downstream of the GSEP site would also occur.

The Concept Drainage Study (GSEP 2009a) provides a summary of discharges at the downstream property boundary which compares existing total outflow at the GSEP boundary with post-development outflows at the GSEP boundary. The post-development discharges from the GSEP site watersheds would be higher than existing conditions as shown on **Table 4.19-3.** This is to be expected given the change to surface conditions, including soil compaction and a more efficient drainage system. The study indicates that the increase in discharge is to be mitigated by the use of detention basins and spreading fields located at each of the solar fields. These basins would be sized and designed to operate in a manner as to reduce the post-development discharges to pre-development conditions.

**TABLE 4.19-3**
**SUMMARY OF EXISTING AND PROPOSED PEAK FLOW RATES AT DOWNSTREAM GSEP BOUNDARY**

| Sub-basin ID | Existing $Q_{100}$ | Developed $Q_{100}$ |
|---|---|---|
| 1 | 4070 | 1156 |
| 2 | 2203 | 4086 |
| 3 | 10,022 | 2006 |
| A (onsite) | 519 | 1295 |
| B (onsite) | 419 | 1127 |

SOURCE: CEC, RSA (June 2010) Soil and Water Table 19.

The use of detention basins can be of concern as they tend to allow for the deposition of sediment, leaving the discharged flow in a sediment deficient condition. This situation can favor downstream erosion as the more concentrated flows balance their sediment load. The Conceptual Grading Plans (GSEP 2010a) for the GSEP do provide for erosion control downstream of the outlet in the form of an engineered energy dissipater and downstream riprap splashpad comprised of 6” rock. The proposed splashpad is not compatible with the wildlife traversability requirements for the GSEP and the design would need to be modified during the formal construction plan process. The velocity and depth of flow off of the energy dissipater structure would need to be reviewed within the context of allowable non-erosive velocities based on site specific soil conditions.

Engineered drainage channels would be constructed along the GSEP boundary wherever the potential for the interception of offsite surface flows exists. These channels would intercept offsite flows and convey them around and through the GSEP site for discharge along the southern GSEP boundary. Onsite flows would be discharged directly into detention basins via a series of smaller internal swales and channels. The conceptual layout of the drainage system is provided on **Figure 4.19-3** as well as on Sheets 1 through 7 of the Conceptual Grading Plans (GSEP 2010a). Discharge of flow along the downstream GSEP boundary would be through the use of flow dispersion structures in the form of pipes and weirs. The intent of these structures is to reduce flow velocities and allow flow to be released/spread out in a manner that mimics existing sheet flow conditions downstream of the GSEP.

Releasing flow back to native ground in a manner similar to existing conditions is of concern for two primary reasons. The first is that flow collected from a large area and discharged in a more concentrated area may result in the potential for increased erosion. The second potential concern is that the change in flow patterns may essentially "dry-up" discreet areas downstream of the GSEP, potentially resulting in an impact to the existing biological resources beyond the GSEP boundary. This issue is discussed further in Section 4.17.

### *Alteration of Drainage Patterns*

#### Onsite Drainage

All existing washes and floodplains within the GSEP boundary would be completely eliminated by the grading of approximately 1,800 acres to provide the flat, uniform and vegetation-free topography required for the construction and operation of the solar mirror array. The existing natural drainage system would be replaced with a system of constructed swales and channels designed to collect and convey onsite flows to designated points of discharge from the GSEP. Onsite stormwater from the GSEP would be discharged offsite through constructed detention basins which would provide for attenuation of increased discharges due to site development.

#### Offsite Drainage

The GSEP would not impact the existing natural drainage system upstream of the GSEP boundary as there are no plans for any diversions, basins, dams or other surface water controls beyond the upstream limits of the GSEP. However, there is the potential for erosion of offsite areas upstream due to the formation of headcuts which could migrate laterally from the engineered channels if they are not stabilized and protected.

Physical modifications to the natural drainage system downstream of the GSEP boundary are not proposed. However, there would be changes to both the existing drainage patterns and sediment transport characteristics as the result of the concentration and diversion of flows upstream of the GSEP, and the subsequent release of those flows at discreet locations on the downstream side of the GSEP. Certain downstream areas would receive more flow than under existing conditions, while other areas may no longer receive any surface flow beyond what may be the result of direct precipitation. The release of concentrated flows at the proposed dispersion structures may have the potential for increased erosion.

The assessment of the impacts to the existing surface flow patterns requires a detailed analysis utilizing FLO-2D or a similar model to clearly delineate the pre- and post-GSEP conditions. Information obtained from such an analysis is critical to assess the extent and adequacy of the proposed flood control measures on the northern eastern GSEP boundaries as well as along the downstream GSEP boundary where flow is released from the engineered channels onto existing ground. The applicant completed FLO-2D modeling for existing conditions and provided the results of that analysis in a Technical Memorandum. The modeling confirmed extensive sheet flow conditions along the entire upstream GSEP boundary. The applicant also provided preliminary FLO-2D modeling for proposed conditions to demonstrate how flow would be released from the downstream GSEP boundary back onto native ground. A conceptual diagram showing flow patterns downstream of the GSEP site is provided on **Figure 4.19-4.** The design for the outlet structures from the downstream engineered channel would allow for flexibility for where flow is released and how much is released at discreet locations.

Implementation of mitigation measures**WATER-10** and**WATER-11** is anticipated to minimize impacts related to surface drainage associated with construction and operation of the GSEP to below the level of significance.

### *Flood Hazards*

#### Construction

The GSEP would be protected from flooding from offsite sources through the construction of engineered channels along upstream GSEP boundaries. These channels would capture and convey up to the 100-year flow through and around the GSEP and discharge it along the southern GSEP boundary. The Concept Drainage Study (GSEP 2009a) and Conceptual Grading Plans (GSEP 2010a) for the GSEP provide information on the layout and geometry of the proposed channels as well as the design discharges for each reach. Cross-sections for each channel were also provided which show how the channels would tie into existing grade and into the proposed facility. Given the extremely flat nature of the site, there do not appear to be any major grading related issues that would favor erosion, such as large cut slopes to accommodate a terraced GSEP design. Channel profiles and flow analyses to determine flow depth and velocity were not provided in support of this impact analysis.

A summary of the proposed channel geometry and hydraulic characteristics as provided in the Concept Drainage Study (GSEP 2009a) and Conceptual Grading Plans (GSEP 2010a) is provided in **Table 4.19-4**. Hydraulic data were not provided for the 10-year flow, which is usually used to demonstrate reasonable channel velocities. However, the 100-year hydraulic data does indicate that most channel reaches do meet, or likely meet, established and reasonable guidelines for allowable channel velocities. Special consideration would need to be given in those sections that do not meet these guidelines for the 10-year flow event.

The Conceptual Grading Plan provided in the DESCP (GSEP 2009a) provides typical channel sections for the proposed collector and conveyance channels. These details show fully armored slopes utilizing gabions or riprap. These materials are not consistent with GSEP requirements for traversability by wildlife and should not be utilized. Soil cement is the preferred method of

channel stabilization. The typical sections in the Conceptual Grading Plan (GSEP 2009a) show 3:1 slopes are predominant for the larger channels. Experience has shown that anything steeper than approximately a 4:1 slope is impractical for a "slope paving" type of construction. At steeper slopes, the soil cement is difficult to place and compact within industry accepted specifications, especially in channels which are more than a few feet deep. The other option is to construct the soil cement in lifts, which would increase material quantities and most likely construction time.

**TABLE 4.19-4**
**SUMMARY OF PROPOSED COLLECTOR AND CONVEYANCE CHANNEL HYDRAULIC CHARACTERISTICS**

| Channel ID | Design Discharge (cfs) | Approximate Length (ft) | Bottom Width (ft) | Channel Depth (ft) | Side Slopes (H:V) | 100-Year Velocity Range (ft/s) |
|---|---|---|---|---|---|---|
| A | 1,156 | 7,500 | 20'-43' | 3' to 4' | 3:1 | 4.5 to 5.1 |
| B | 4,086 | 8,000 | 31'-150' | 3' to 4' | 3:1 | 5.6 to 9.6 |
| C | 2,006 | 3,800 | 20' to 45' | 3' to 4' | 3:1 | 3.0 to 3.7 |
| B/C | 6,092 | 5,000 | 150' to 156' | 4' to 5' | 3:1 | 5.7 to 7.2 |
| D | 2,600 | 7,500 | 24' to 91' | 3' to 6' | 3:1 | 5.5 to 9.6 |
| E | 254 | 1,300 | 20' | 3' | 3:1 | 3.2 to 8.6 |
| D/E | 2,854 | 3,500 | 95' | 5' | 3:1 | 5.7 |

SOURCE: CEC, RSA (June 2010) Soil and Water Table 20.

### Operation

During operation, the proposed collector and conveyance channels along the northern and eastern GSEP boundaries would be exposed to incoming flows along most of their extent. These inflows could include concentrated runoff at the more defined drainages, shallow sheet flow, and smaller more localized flows. All of these elements have the ability to cause erosion of unprotected channel banks and berms as well as to create headcutting which would extend roughly perpendicular from the outer channel bank into the adjacent floodplain. These headcut features have the potential to achieve the same depth as the main collector channel and can extend upstream for several hundred feet over time due to numerous smaller flow events, or can occur very quickly from a single large event depending on the magnitude of flow at a given location. Impacts to areas beyond the GSEP boundaries can occur due to these erosional features. Appropriate bank stabilization measures must be implemented to ensure that headcutting is prevented at all locations where flow enters the engineered channels.

Operation of the proposed channels and erosion mitigation measures would require inspection and maintenance over the life of the facility to ensure that the channels are operating as intended and that potential and observed erosion issues are addressed promptly to minimize damage to the facility and areas beyond the GSEP boundary. Relatively small problems and erosional features which develop during smaller and more frequent events can become the focal point for problems during larger events. The applicant has prepared a Draft Channel Maintenance Plan which addresses some of the potential issues associated with long term operation of the channels.

However, the plan does not adequately address the issue of the collection of offsite flows or the use of soil cement along areas subject to inflows from offsite watersheds, and updates to the plan are included as required mitigation.

### *Channel Maintenance Program*

The main goals of the Channel Maintenance Program would be to maintain the diversion channels to meet its original design to provide flood protection, protect offsite areas form erosion, support GSEP mitigation, protect wildlife habitat and movement/migration, and maintain groundwater recharge. Compliance mitigation measure **WATER-13** would reduce the impacts below the level of significance.

## Surface Water Quality

GSEP storm water may encounter soil or chemicals deleterious to aquatic and terrestrial plant and wildlife. The GSEP Applicant proposes to implement BMPs for managing potentially harmful storm water and protect water quality. Potential water quality impacts could occur during operations if contaminated or hazardous materials used during operations were to contact storm water and drain offsite. Although the GSEP would alter natural storm water drainages, it would use BMPs to reduce potential impacts related to concentrated drainage and ensuing soil erosion and sediment transport offsite. Recognizing these potential impacts, the applicant has prepared a draft industrial SWPPP required by the general waste discharge requirements for industrial activity.

### *Construction*

Potential threats to surface water quality related to construction on the GSEP site as well as linear features would include: potential increases in sediment loads to adjacent streams and washes; and accidental spills of hydrocarbon fuels and greases associated with construction equipment as well as HTF or other fluids transported to and stored onsite during construction.

### *Operation*

Potential threats to surface water quality related to operations include: potential increases in sediment loads to adjacent washes; accidental spills of hydrocarbon fuels and greases (including HTF fluid) associated with operations equipment, and accidental releases from the HTF treatment area and the surface impoundments, including wastewater from the pre-treatment and RO procedures.

Implementation of mitigation measures **WATER-1**, **WATER-2**, **WATER-12**, and **WATER-13** is anticipated to reduce impacts to surface water quality to below the level of significance. Additional requirements for mitigation of potential surface water quality impacts would also be included as a part of the waste discharge requirements for the LTU and surface impoundment that would be included in mitigation measure **WATER-6.**

# Alternatives

## *Reduced Acreage Alternative*

This alternative is located entirely within the boundaries of the proposed GSEP. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed GSEP, as well as the area affected by the linear GSEP components.

### Groundwater Basin Balance

Groundwater basin balance in the vicinity of the Reduced Acreage Alternative site could be impacted as a result of the construction and operational water use. The potential impact would be approximately 50 percent less than the proposed GSEP as the Reduced Acreage Alternative uses approximately 50 percent less water than the proposed GSEP.

As previously stated, the GSEP has the potential to indirectly impact flow in the Colorado River by inducing underflow into the PVMGB and the Colorado River Basin. Implementation of the mitigation measure**WATER-15** specified in is anticipated to reduce the potential for impacts from water drawn from the Colorado River through groundwater pumping to be low.

### Groundwater Levels

Groundwater levels could be impacted as a result of construction and operational water use. The potential impact is expected to be approximately 50 percent less than the proposed GSEP as the Reduced Acreage Alternative would use approximately 50 percent less water than the proposed GSEP.

Groundwater levels near the GSEP's water supply wells would decline during the GSEP pumping. Local decline of groundwater levels within the cone of depression could affect nearby wells. While preliminary studies and calculations have been made to assess the potential for impact, the quantification of the impact is considered an estimate and cannot be accurately quantified until actual long-term groundwater production occurs. In spite of this, implementation of mitigation measures **WATER-3** through **WATER-5** is expected to minimize impacts to groundwater levels.

The applicant would be required to implement mitigation measure**WATER-17** that requires a Subsidence Monitoring and Action Plan to assess and mitigate potential effects of non-elastic subsidence associated with groundwater extraction in the vicinity of the proposed production wells.

Mitigation for potential impacts to groundwater-dependent vegetation is discussed in Section 4.17.

### Groundwater Quality

Groundwater quality could be impacted as a result of the operation of the LTU, surface impoundments, and septic fields. The potential impact would be similar to that of the proposed

GSEP. Implementation of mitigation measures**WATER-5** through **WATER-7** and **WATER-20** is expected to minimize impacts to groundwater levels below the level of significance.

#### Surface Water Hydrology and Drainage

The impacts and mitigation measures would be similar to the proposed GSEP, except proportionately smaller in scale with regards to overall natural area lost to mass grading. All existing washes within the smaller developed portion of the site would be eliminated by onsite grading and replaced with a system of engineered swales and channels. Mitigation of potential erosion and headcutting in the engineered channels would still be required as would a careful design along the downstream GSEP boundary to ensure the diverted flows are released in a manner which does not increase offsite erosion. However, the overall volume of offsite flow that would need to be collected and conveyed around the GSEP would be less due to the reduced footprint, and impacts to the floodplain downstream would also be proportionately reduced.

#### Surface Water Quality

Surface water quality could be impacted as a result of surface grading. In addition, potential water quality impacts could occur during construction or operations if contaminated or hazardous materials were to contact storm water and drain offsite. Moreover, the GSEP would alter natural storm water drainages and would impact surface water quality downslope. The potential impacts from these sources would be reduced by roughly half in this alternative as compared to the Proposed Action.

### *Dry Cooling Alternative*

In this alternative, approximately 18 fans would be required for each ACC for the two solar fields. The 18 fans would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The ACC described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the ACCs up to 120 feet in height. In addition to the ACC and fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 1,600 acre-feet per year (ac-ft/yr) to 202 ac-ft/yr for the two 125-MW power plants combined. This reduction in water use would reduce impacts to water and biological resources.

This alternative is located entirely within the boundaries of the proposed GSEP. It simply eliminates the use of wet-cooling towers and incorporates the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed GSEP.

Wet-cooling maximizes power plant fuel efficiency by providing a continuous source of effective cooling for the plant's steam condensers. Dry cooling would typically provide less effective cooling of the condensers, reducing the efficiency of the steam cycle portion of the power plant, and increasing operational electrical demand from 10% to 12% of STG output.

The FSA for the Beacon Solar Energy Project (08-AFC-2; BSEP 2009) showed that annual average fuel efficiency would be reduced 5-7 percent compared to a wet cooling system. The GSEP applicant stated that use of dry cooling would result in a 7.4 percent decrease in total annual net MWh compared with a wet cooling system (GSEP 2009a).

### Groundwater Levels and Basin Balance

The Dry Cooling Alternative would reduce operational use of water from 800 ac-ft/yr to approximately 101 ac-ft/yr per 125 MW power block (NextEra 2010). The Dry Cooling Alternative would include a Wet Surface Air Cooler (WSAC) to provide auxiliary cooling during extremely hot days.

A minimum of two groundwater supply wells would be utilized. The Project well field would include a sufficient number of standby wells to provide the Project with water in the event the primary wells are shut down for maintenance. As currently planned, the wells would pump groundwater from the Bouse Formation within the CVGB and would be screened approximately between 800 to 1,200 feet below ground surface. Based on investigations performed for the project, water quality is expected to be brackish and near 3,000 parts per million total dissolved solids (TDS).

The Bouse Formation and fanglomerate are apparently confined aquifers, so drawdown impacts realized when pumping from these formations would be spread out over a greater distance than in an unconfined aquifer, and impacts to the overlying water table would be similarly diffused. Impacts from pumping groundwater from the Bouse Formation as a source of water supply were investigated and determined to be minor.

A comparison was made between the average annual basin budget balance with the anticipated GSEP water production requirements in this alternative and the Proposed Action. **Table 4.19-5** presents the anticipated GSEP's water requirements along with the average annual basin budget balance for the 37-month construction period. Currently, the CVGB balance is positive by approximately 2,608 ac-ft/yr whereby inflow (approximately 13,719 ac-ft/yr) to the basin is slightly greater than estimated outflows (approximately 11,111 ac-ft/yr) to the basin. Approximately 1,200 ac-ft/yr is attributed to subsurface outflow to the adjacent PVMGB and the Colorado River.

It is anticipated that groundwater extraction during construction (~616 to 1,368 ac-ft/yr) and operation (~202 ac-ft/yr) would not impact the CVGB balance as the 1,368 ac-ft/yr during construction and the 202 ac-ft/yr for power plant operation plus an additional 16 ac-ft/yr for potable use during operations would not exceed the positive yearly balance of 2,608 ac-ft/yr.

Construction and operation of the GSEP would have an impact on basin balance in the CVGB. The GSEP's pumping could also have an effect on the adjacent PVMGB by reducing or eliminating outflow to the PVMGB or even inducing inflow from the Colorado River into the PVMGB. Given the location of the GSEP, the anticipated annual GSEP water requirements, the GSEP could impact the PVMGB.

**TABLE 4.19-5**
**ESTIMATED CHANGE TO CHUCKWALLA VALLEY GROUNDWATER BASIN BUDGET**
**(AVERAGE YEAR CONDITIONS)**

| GSEP Component | Years | Annual Basin Budget Balance (ac-ft/yr) | GSEP Requirements (ac-ft/yr) | Net Budget Balance (ac-ft/yr) |
|---|---|---|---|---|
| Construction | 1 | 2,608 | 1,368 | 1,240 |
| | 2 | 2,608 | 616 | 1,992 |
| | 3 | 2,608 | 616 | 1,992 |
| Operations | 4-33 | 2,608 | 218 | 2,390 |

NOTE: Operations includes water for WSAC cooling make-up, process water make-up, and other industrial uses such as mirror washing; this water would be supplied from on-site groundwater wells, which would also be used to supply water for employee use (*e.g.,* drinking, showers, sinks, and toilets).

The Applicant did not provide an analysis of the proportion of water originating from storage, from natural recharge, and/or underflow from the Colorado River. However, as previously stated, water in the Colorado River is fully appropriated and the Colorado River would be an impacted. The U.S. Geological Survey has indicated that the PVMGB and the CVGB lie within a basin tributary to the Colorado River and that wells drawing groundwater could be considered to be withdrawing water from the Colorado River Aquifer (Wilson et al., 1994). Consequently, the GSEP has the potential to divert Colorado River water without any entitlement to the water, and all groundwater production at the site would be considered Colorado River water.

The GSEP Applicant could choose to implement mitigation measure **WATER-19** to conduct a refined analysis of the quantity of water contributed by the Colorado River from GSEP groundwater extraction. This analysis may also be used to estimate the volume of water that must be replaced**.**

We note that future water use in the CVGB may be governed by impending regulations being formulated by the USBR. These are discussed in the section addressing LORS, below. Waste discharge to the evaporation ponds using the ACC is approximately 50 percent of the wet cooling option (92 gpm compared with the annual average of 182 gpm for the proposed GSEP using wet-cooling). As such, the Applicant estimates that approximately one 5-acre evaporation pond would be required for each 125 MW power block (GSEP 2009f). It is expected that residual precipitated solids would be removed from ponds approximately every twenty years to maintain a solids depth no greater than approximately three feet for operational and safety purposes. Approximately 400 tons of evaporative residue would be accumulated yearly, which equates to approximately 8,000 tons of evaporative residue being removed during the cleanout at year 20 and a total estimate of 12,000 tons over 30 years.

### Other Potential Hydrologic Resource Impact Categories

Other potential hydrologic resource impact categories, including groundwater quality, surface water hydrology and drainage, and surface water quality, would be similar to those impacts described for the proposed GSEP. As discussed previously, the overall footprint of the facility

would remain the same and other infrastructure would be the same, as compared to the proposed GSEP.

### *No Action Alternative A:*

Under this alternative, the proposed GSEP would not be approved by the BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the GSEP site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, the impacts to water resources from the construction and operation of the proposed GSEP would not occur. However, the land on which the GSEP is proposed would remain available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of the GSEP, other renewable energy projects may be constructed to meet State and federal mandates, and those projects would have similar impacts in other locations.

### *No Project Alternative B:*

Under this alternative, the proposed GSEP would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the GSEP site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, impacts to water resources would result from the construction and operation of the solar technology and resulting ground disturbance and would likely be similar to the impacts to water resources from the proposed GSEP, including water quality impacts and impacts to jurisdictional waters. Different solar technologies require different amounts of grading; however, it is expected that all solar technologies would require grading and maintenance. As such, this No Project Alternative could result in impacts to and water resources similar to the impacts under the proposed GSEP.

### *No Project Alternative C:*

Under this alternative, the proposed GSEP would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the GSEP site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no water resources impacts.

As a result, this No Project Alternative would not result in the impacts to water resources under the proposed GSEP. However, in the absence of the GSEP, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

## 4.19.3 Discussion of Cumulative Impacts

**Table 4.1-5** provides a listing of current and reasonably foreseeable renewable energy projects, other BLM authorized action/activities, and other actions/activities that BLM considers reasonably foreseeable. Most of these projects have, are, or would be required to undergo their own independent environmental review under NEPA. Even if the cumulative projects described in **Table 4.1-5** have not yet completed the required environmental review processes, they were considered in the cumulative impacts analyses in this SA/Draft EIS.

### *Reasonably Foreseeable Projects*

Reasonably foreseeable projects that may impact the water resources of the area were deemed to include only those projects located in the CVGB. **Table 4.19-6** lists the foreseeable projects and the anticipated water use associated with each of the projects.

### *Construction and Operation*

The construction of the proposed GSEP is expected to result in short term adverse impacts related to construction activities. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the proposed GSEP. In addition, it is expected that some of the future and foreseeable projects described above may be operational at the same time as the proposed GSEP. As a result, there may be substantial long term cumulative impacts during operation of these projects related to water resources.

There may be substantial short-term and long-term impacts during construction and operation of those cumulative projects related to: groundwater basin balance, water table levels, groundwater quality, surface water hydrology, and surface water quality; these are discussed below.

### *Groundwater Basin Balance*

There is concern that the amount of groundwater used for both construction and operations would place the groundwater basin into overdraft. Groundwater overdraft is “the condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions” (CDWR 1998).

Any withdrawals that exceed the average natural recharge and exceed a percentage of the total amount of groundwater in storage would be an impact. The following discussion presents an analysis of the potential for overdraft and depletion of groundwater in storage to occur.

**TABLE 4.19-6**
**REASONABLY FORESEEABLE PROJECTS AND ANTICIPATED WATER USE**

| Project | Proponent | BLM Serial ID | Technology | Source | Use | Water Use – Renewable Projects (ac-ft/yr) | | | | | | | | | References |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019-2043 | |
| Chuckwalla Solar I | Chuckwalla Solar I LLC | CACA 48808 | Photovoltaic (200MW) | Chuckwalla Basin | Construction | 20 | 20 | 10 | -- | -- | -- | -- | -- | -- | Estimates |
| | | | | | Operation | -- | 5 | 7 | 10 | 10 | 10 | 10 | 10 | 10 | |
| Eagle Mountain Soleil | enXco | CACA 49492 | Photovoltaic (100MW) | Chuckwalla Basin | Construction | -- | 10 | 10 | -- | -- | -- | -- | -- | -- | Estimates |
| | | | | | Operation | -- | -- | -- | 5 | 5 | 5 | 5 | 5 | 5 | |
| Desert Lily Soleil | enXco | CACA 49494 | Photovoltaic (100MW) | Chuckwalla Basin | Construction | -- | 20 | 20 | -- | -- | -- | -- | -- | -- | Estimates |
| | | | | | Operation | -- | -- | -- | 5 | 5 | 5 | 5 | 5 | 5 | |
| Desert Sunlight Solar Farm | First Solar | CACA 48649 | Photovoltaic (550MW) | Chuckwalla Basin | Construction | 27 | 27 | 27 | -- | -- | -- | -- | -- | -- | Estimates |
| | | | | | Operation | -- | -- | -- | 4 | 4 | 4 | 4 | 4 | 4 | |
| Eagle Mountain Pump Storage | Eagle Crest Energy Company, LLC | FERC 12509001 | Pump – Storage (1276MW) | Chuckwalla Basin | Construction | -- | 308 | 308 | 8,066 | 8,066 | 8,066 | 8,066 | -- | -- | Application to FERC |
| | | | | | Operation | -- | -- | -- | -- | -- | -- | -- | 2,688 | 1,763 | |
| Genesis Solar Energy | Genesis Solar LLC | CACA 48880 | Parabolic Trough (250MW) | Chuckwalla Basin | Construction | 1,368 | 616 | 616 | -- | -- | -- | -- | -- | -- | Application to Energy Commission |
| | | | | | Operation | -- | -- | | 1,644 | 1,644 | 1,644 | 1,644 | 1,644 | 1,644 | |
| Mule Mountain Solar Project | Bullfrog Green Energy, LLC | CACA 49097 | Photovoltaic (500MW) | Chuckwalla Basin | Construction | 20 | 20 | 20 | -- | -- | -- | -- | -- | -- | Estimates |
| | | | | | Operation | -- | -- | -- | 1 | 1 | 1 | 1 | 1 | 1 | |
| Mule Mountain Soleil | enXco | CACA 49488 | Photovoltaic (200MW) | Chuckwalla Basin | Construction | -- | 20 | 20 | -- | -- | -- | -- | == | -- | Estimates |
| | | | | | Operation | -- | -- | | 10 | 10 | 10 | 10 | 10 | 10 | |
| Palen Solar Power | Palen Solar I, LLC | CACA 48810 | Parabolic Trough (500MW) | Chuckwalla Basin | Construction | 480 | 480 | 480 | -- | -- | -- | -- | -- | -- | Application to Energy Commission |
| | | | | | Operation | -- | -- | -- | 303 | 303 | 303 | 303 | 303 | 303 | |
| **Total** | | | | | | 1,915 | 1,526 | 1,518 | 10,048 | 10,048 | 10,048 | 10,048 | 4,670 | 3,745 | |

A comparison was made between the average annual basin budget with the anticipated foreseeable projects cumulative construction and operation water production requirements. **Table 4.19-7** presents the anticipated project's water requirements (Years 2011-2043) along with the average annual basin budget. Currently, the CVGB balance is positive by approximately 2,608 ac-ft/yr, whereby inflow (approximately 13,719 ac-ft/yr) to the basin is slightly greater than estimated outflows (approximately 11,111 ac-ft/yr) to the basin.

**TABLE 4.19-7**
**ESTIMATED CHANGE TO CHUCKWALLA VALLEY GROUNDWATER BASIN BUDGET (AVERAGE YEAR CONDITIONS)**

| Years | Annual Basin Budget Balance | Cumulative Project Requirements (ac-ft/yr) | Net Budget Balance (ac-ft/yr) | Cumulative Budget Balance (af) | Cumulative Positive/Deficit as a Percent of Total Recoverable Storage[a] |
|---|---|---|---|---|---|
| 2011 | 2,608 | 1,915 | 693 | 693 | 0.005% |
| 2012 | 2,608 | 1,526 | 1,082 | 1775 | 0.012% |
| 2013 | 2,608 | 1,518 | 1,090 | 2865 | 0.019% |
| 2014 | 2,608 | 10,048 | -7,440 | -4575 | -0.031% |
| 2015 | 2,608 | 10,048 | -7,440 | -12,015 | -0.08% |
| 2016 | 2,608 | 10,048 | -7,440 | -19,455 | -0.13% |
| 2017 | 2,608 | 10,048 | -7,440 | -26,895 | -0.18% |
| 2018 | 2,608 | 4,670 | -2,062 | -28,957 | -0.19% |
| 2019 | 2,608 | 4,670 | -2,062 | -30,094 | -0.20% |
| 2043 | 2,608 | 3,745 | -1,137 | -57,382 | -0.383% |

[a] Based on a total recoverable storage of 15,000,000 af.

It is anticipated that groundwater extraction of foreseeable projects during construction of the GSEP would range from 1,915 ac-ft/yr in Year 2011 to a peak of 10,048 ac-ft/yr in Years 2014 through 2017, which would exceed the basin balance in Years 2014 through 2017 by 7,440 ac-ft/yr. The CVGB would be in overdraft conditions commencing in Year 2014. It is anticipated that groundwater extraction during operations of reasonably foreseeable projects would be approximately 3,745 ac-ft/yr, which would exceed the basin balance by 1,137 ac-ft/yr. The cumulative change in storage over the construction and operational period (33 years) would amount to approximately -57,000 af, which would equate to less than 0.5 percent of the total amount of the estimated total recoverable groundwater in storage (15,000,000 af).

However, the amount of water that is in storage (estimated to be as much as 15,000,000 af) in the basin greatly exceeds the amount of cumulative overdraft (57,000 af). In light of these facts, the GSEP's contribution to the cumulative impact to basin balance is less than cumulatively considerable.

Lastly, the I-10 corridor within the CVGB has been targeted for renewable energy projects that have not been identified or quantified as to amounts of water required for development. Given that perennial surface water sources are non-existent and the only available water source is groundwater, it is likely that these as yet unidentified projects could further develop the groundwater resources and exacerbate the cumulative overdraft conditions identified above. However, given the amount of total recoverable groundwater in storage (estimated at 15,000,000 af), the impact would be minimal.

In addition, the cumulative impact analysis conducted by the GSEP suggested that during the course of operations for all reasonably foreseeable projects, the subsurface outflow from the CVGB into the PVMGB and the Colorado River Basin would decline from approximately 400 ac-ft/yr to approximately 81 ac-ft/yr in 2043 (see WPAR, 2009b Table 2). Reduction of flows into the PVMGB from the CVGB could thereby result in a reduced volume of groundwater discharging into the Colorado River, and/or could induce underflow from the Colorado River into the adjacent groundwater basins. These conditions would result in a reduction in the volume of water available in the Colorado River Basin. However, implementation of the required mitigation, which includes measures to offset GSEP pumping with reductions in pumping elsewhere within the basin, would avoid these potential impacts.

### *Groundwater Levels*

The regional model used by AECOM (2010a) is a two-dimensional superposition model developed using MODFLOW code (Harbaugh et al., 2000) for the Parker-Palo Verde-Cibola area, which includes the CVGB and the GSEP site. The model employed a simple vertical geometry and a large grid spacing to evaluate the impacts from groundwater pumping on the Colorado River.

The modeling results suggest (**Figure 4.19-5**) that during the life of all the reasonably foreseeable projects, groundwater level declines of five feet or more would be located at a distance of approximately 4 miles from the proposed production wells at the GSEP site. The closest existing well is located at a distance of 3 miles. In addition, water level declines of 1 foot or more could be observed up to eight miles from the proposed production wells. This modeling also suggests that impacts to groundwater will extend into the Palen McCoy Wilderness Area.

As stated in Section 706 of the California Desert Protection Act of 1994 (P.L. 103-433), Congress has reserved all water that is “necessary to fulfill the purposes” of all wilderness areas designated under the Act, including preservation of wildlife and ecosystems of the California desert, as long as the water was unappropriated as of October 31, 1994. Prior to publication of the ROD, the Applicant will need to demonstrate that groundwater extraction for the GSEP is unlikely to violate any reserved water rights associated with the adjacent Palen-McCoy wilderness area or any other wilderness areas in the Chuckwalla Valley.

Modeling conducted by the applicant indicated water level declines less than what is conservatively presented here. While preliminary studies and calculations have been made to assess the potential for impact, the quantification of the impact is considered an estimate and

would not be able to be accurately quantified until actual long-term groundwater production occurs. Implementation of mitigation measures **WATER-3** through **WATER-5** is anticipated to mitigate potential impacts to groundwater users (wells) associated with the potential lowering of the groundwater table. Impacts and proposed mitigation associated with biological resources are discussed in Section 4.17**.**

### *Groundwater Quality*

There is a potential that cumulative groundwater quality impacts could occur from the proposed GSEP as listed on **Table 4.19-6** during construction and operation if contaminated or hazardous materials used during construction and operations were to be released and migrate to the groundwater table.

The proposed GSEP would be expected to contribute only a small amount to the possible short-term cumulative impacts related to groundwater quality in the CVGB, given the distance to the groundwater table (70-90 feet bgs) and the proposed implementation of a hazardous material management plan and monitoring plans associated with operation of LTUs, surface impoundments, septic systems, and other various operations. With implementation of the mitigation measures **WATER-6** and **7** and **WATER-20**, cumulative impacts associated with the GSEP to groundwater quality are anticipated to be small.

### *Surface Water Hydrology*

The cumulative impacts of the proposed GSEP and other projects listed in Table 4.19-6 on the local surface water hydrology are directly related to proposed onsite grading and the potential construction and operation of a network of engineered collector/conveyance channels designed for the purpose of protecting the various projects from flooding. The proposed projects could change both the extent and physical characteristics of the existing floodplains within and downstream of each project site. There is not enough information available on each site, nor has a regional study been completed, to define the extent of the cumulative effects of these projects on surface water within the watershed. However, it is assumed that each of these projects would be required to define their impacts and mitigate where required.

The proposed Project would be expected to contribute only a small amount to the possible short-term cumulative impacts related to surface water hydrology because the implementation of the mitigation measures specified in Appendix G would reduce the project-specific impacts to low levels.

### *Surface Water Quality*

The cumulative impacts of the proposed foreseeable projects as listed on **Table 4.19-6** could have an impact on surface water quality. It is expected that stormwater generated on the various project sites may encounter soil or chemicals deleterious to aquatic and terrestrial plants and wildlife. All of the projects would be required to implement BMPs for managing potentially harmful storm water and protecting water quality. Potential water quality impacts could occur during operations if contaminated or hazardous materials used during operations were to contact storm water and

drain offsite. Therefore, implementation of the mitigation measures **WATER-1, 2, 8, 9, 10, 11** and **13** would be required.

All of the proposed projects would alter natural storm water drainages and the expected use of BMPs would reduce potential impacts related to concentrated drainage and ensuing soil erosion and sediment transport offsite. The proposed GSEP would be expected to contribute only a small amount to the possible short-term cumulative impacts related to surface water quality with implementation of the mitigation measures **WATER-1, 2, 8, 9, 10, 11** and **13**.

### *Closure and Decommissioning*

The decommissioning of the proposed GSEP is expected to result in adverse impacts related to water resources similar to construction impacts. It is unlikely that the construction or decommissioning of any of the cumulative projects would occur concurrently with the decommissioning of the GSEP, because the decommissioning is not expected to occur for approximately 40 years. As a result, there may not be impacts related to water resources during decommissioning of the proposed GSEP generated by the cumulative projects. The impacts of the decommissioning of the proposed GSEP would not be expected to contribute to cumulative impacts related to water resources.

## Summary of Mitigation Measures

The implementation of mitigation measures imposed by the Energy Commission as Conditions of Certification for the GSEP also would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G. The following address impacts on water resources:

WATER-1, WATER-2, WATER-3, WATER-4, WATER-5, WATER-6, WATER-7, WATER-8, WATER-9, WATER-10, WATER-11, WATER-12, WATER-13, WATER-14, WATER-15, WATER-16, WATER-17, WATER-18, WATER-19, WATER-20

## Residual Impacts after Mitigation Measures were Implemented

Implementation of the mitigation measures identified above would address potential GSEP-related impacts on water resources. However, a small degree of residual impact could remain even following implementation of the proposed mitigation measures. The following text reviews the efficacy of the proposed mitigation measures, and discusses potential for residual impacts, as relevant.

Colorado River Effects (WATER-15 and WATER-19): Implementation of the proposed mitigation would ensure that either (1) potential effects on the Colorado River hydrology are avoided entirely, or (2) the applicant applies for and receives an allocation of water from the Colorado River. No residual impact would occur.

Groundwater Level Mitigation (WATER-3, WATER-4, WATER-5, WATER-16, and WATER-17): Implementation of these mitigation measures would ensure that wells are properly sited and

installed; ensure that no more than 1,368 ac-ft/yr are used during construction and no more than 1,644 ac-ft/yr are used during GSEP operation; ensure implementation of a groundwater level monitoring, mitigation, and reporting plan during construction and operation; provide monetary or other reimbursement for potential impacts to wells; and provide for groundwater production reporting. As discussed previously, these measures would help ensure that potential reductions in groundwater levels are minimized. However, a relatively minor degree of residual groundwater level reduction would occur as a result of GSEP implementation, as discussed previously.

Water Quality (WATER-2, WATER-6, WATER-7, WATER-12, WATER-14, and WATER-20): These mitigation measures ensure compliance with applicable laws and other requirements related to stormwater discharges on site, design and operational requirements for the proposed septic system and leach field, drinking water standards, and documentation of groundwater quality during operations. Compliance with these measures would ensure that levels of construction-related sediment loading, erosion, and other water quality pollutants would be minimized, and that potential degradation of groundwater quality associated with the proposed septic system would be minimized. Although residual surface and groundwater quality impacts are not considered significant, a very small degree of residual surface and groundwater quality reduction is expected, in comparison to the No Project Alternative, due primarily to the introduction of treated leachates from the proposed septic system, but also associated with small amounts of HTF that are released into the environment.

Drainage and Flooding (WATER-1, WATER-8, WATER-9, WATER-10, WATER-11, and WATER-13): These mitigation measures ensure that potential GSEP drainage and flooding related impacts would be minimized. They include completion of a revised and updated Drainage Report that would include updated analysis and considerations for climate change related updates to the current Drainage Report; an updated hydraulic analysis; compliance with Riverside County guidelines for conveyance channels, revisions to preliminary grading and drainage plans, and implementation of a channel maintenance program during GSEP operations. These mitigation measures would ensure that potential impacts related to drainage and flooding are reduced to insignificant levels. Residual effects would be minor, but could include minor fluctuations in sediment transport along washes adjacent to and downstream of the GSEP.

## Unavoidable Adverse Impacts

None.

# 4.20 Impacts on Wildland Fire Ecology

## 4.20.1 Impact Assessment Methodology

Impacts of fire on the wildlands in the GSEP area would be related to the changes to the footprint size of the GSEP. The incidence of human-vehicle-caused wildfire would be related to the numbers of vehicles accessing the site for construction, operations, and maintenance activities, as section 3.23 documents the primary causes of fire in the area are lightning and vehicles. For the No Action/No Project Alternatives, Proposed Action, Dry Cooling Alternative, and Reduced Acreage Alternative, differences in fire incidence and therefore impacts in the GSEP area would also vary by the relative ability and relative numbers of vehicles accessing the GSEP area in the short and long term. These estimates come from section 4.18, Transportation and Public Access.

## 4.20.2 Discussion of Direct and Indirect Impacts

### Proposed Action

Direct impacts of wildfire would include mortality of plants and wildlife and loss of forage and cover. Annual plants and burrowing wildlife would be less affected in the short term because seeds in the soil and animals under the soil would not likely be consumed. Indirect impacts would result in changes to the vegetation communities and the wildlife supported by the communities. The spread of invasive plants, especially annual grasses, creates an increased potential for wildfires which can result in disastrous ecological change. Historically in the planning area, the occurrence of wildfires has been low. Repeated fires are known to decrease the perennial plant cover and to aid some invasive annual plants. In turn, where they gain widespread propagation, these invasive plants would provide fuel to carry flames, potentially resulting in larger fires in the future. Surface disturbing activities and vehicle use that promotes the introduction of invasive plants would increase the likelihood of larger fires in the future. Fires have not been common or large in the NECO planning area in the past, but may increase as the invasive, non-native grass cover increases.

Wildfires (caused by construction or downed transmission lines) are rare but the increase in daily vehicle use in the area from an anticipated 40-50 new jobs during operation and up to 1000 jobs during construction could increase the risk of ignition. Other temporary and permanent impacts from the GSEP could occur to surrounding vegetation communities from grading activities creating air-born, fugitive dust, sedimentation, and erosion, which disruption of photosynthesis and other metabolic processes. The destruction of plants and soil crusts by windblown sand and dust also exacerbates the erosion of the soil and accelerates the loss of nutrients (Okin et al. 2001).

Brooks (1998) performed the most in-depth analyses of the correlations between invasive annual plants and environmental impacts. He found that, despite comprising only 5 percent of the annual plant species in the desert, two invasive annual grasses--red brome (Bromus madritensis ssp. rubens) and Mediterranean split grass (Schismus spp.)--and one invasive forb--fileree (Erodium cicutarium)--accounted for 66 percent of total plant biomass during a high rainfall year.

Biomasses of each were positively correlated with disturbances from off-highway vehicles and sheep grazing combined. He concluded that invasive annual grasses out competed native species. Invasive annual grasses contributed greatly to fire fuels, and combustion of dry red brome produced flame lengths and temperatures sufficient to ignite perennial shrubs. He cited other literature (e.g., pp. 11-12) showing that around the world plant invasions are promoted by human disturbances. He also showed that soil nutrients played a significant role and that nitrogen deposition may enhance the rate of invasion.

Wildfire suppression efforts would result in reduced particulate (PM10) production and visibility impairment from smoke and wild-blown dust. Short term impacts from fire suppression potentially would increase levels of particulate from surface disturbance of fire fighting equipment and operations. Fire fighting efforts would use minimal ground distributing techniques such as aerial fire suppression and ground crews with hand tools. Successful fire suppression efforts minimize the number of acres burned, and result in less vegetative loss, and thereby, less wind erosion of particulate matter.

### Alternatives

Although the Proposed Action, Dry Cooling Alternative, and Reduced Acreage Alternative would involve different acreages and configurations, the generating capacity and construction, operations, and maintenance vehicle use would be similar between these three alternatives. Long term operations and maintenance phases of these three alternatives would tend to decrease recreation-related vehicle access to and through the GSEP area, resulting in a reduced incidence of fire compared to No Project Alternative B.

With No Action Alternative A and No Project Alternative C, vehicle access to and through the GSEP area would be similar and, therefore, fire incidence and size would be similar in the short and long term, because future solar development would not necessarily be precluded. No Project Alternative B would result in potentially greater recreation-related vehicle access in the long term as solar energy development projects would be precluded from the GSEP area. Such vehicle access in the long term would increase along present trends and increase the incidence of vehicle-related wildfires compared to No Action Alternative A or No Project Alternative C.

The chance for exotic annual weeds to establish and change the fire regime in the GSEP area would vary with the slightly different footprint size of the Proposed Action, Dry Cooling Alternative, and Reduced Acreage Alternatives; 1,746 acres; 1,746 acres, and 950 acres, respectively.

## 4.20.3 Discussion of Cumulative Impacts

Incremental impacts of the GSEP could result in a cumulative effect on wildland fire risk in combination with other past, present, or reasonably foreseeable future actions. For purposes of this analysis, the geographic scope of the cumulative effects analysis for fire resources consists of eastern Riverside County, which includes about 2,800 square miles (about 1,792,000 acres). Although potential fires would not be constrained by political boundaries, the natural conditions

and existing fire response infrastructure are such that it would be reasonable to assume that a fire could be contained within this area. This boundary also is consistent with the California Department of Forestry and Fire Protection's Fire Hazard Severity Zone boundaries (CDF 2010; CDF 2007). Potential cumulative wildfire effects could occur over the course of 40 or more years, encompassing the entire lifespan of the GSEP, from construction and operation and maintenance, through closure and decommissioning.

Existing conditions within the cumulative impacts area reflect a combination of the natural condition and the effects of past actions and are described in FEIS chapter 3. Direct and indirect effects of the GSEP are analyzed above. Past, present and reasonably foreseeable future actions making up the cumulative scenario are identified in Section 4.1. The installation and operation of transmission lines and the use of equipment (including motor vehicles) that could spark or otherwise provide an ignition source could combine to cause or create a cumulative impact. Further, renewable energy projects that use or would use solar trough technology (such as the Blythe and Palen solar projects) are expected to use heat transfer fluid (HTF) that would be heated to a high temperature (about 750 degrees Fahrenheit); management of this and other hazardous materials on site could complicate any necessary firefighting efforts. For example, in 1999, a 900,000 gallon HTF storage tank exploded at a solar power plant in the Mojave Desert, causing fire and related concerns about adjacent containers that held sulfuric acid and caustic soda. Additionally, the increased human presence and disturbance caused by the construction, operation and overall development that would occur under cumulative scenario could advance the rate of invasion by non-native vegetation and, thereby, contribute to fire fuel-loading that would burn with higher flames and hotter temperatures. Cumulative impacts would vary by alternative only to the degree to which direct and indirect impacts would vary by alternative. In this case, the incremental impact of the action alternatives is not expected to vary materially from the proposed action, because similar types of construction, operation and maintenance and closure and decommissioning activities would occur. However, to the extent that development of the site for utility-scale power generation would preclude some OHV use, wildfire risks associated with recreational uses would diminish. Solar energy development of the site also could occur under No Project Alternative B; therefore, the incremental impact of this alternative is not expected to be materially different than the proposed action. For No Action Alternative A and No Project Alternative C, wildfire risks would continue to be associated with OHV and other recreational use of the area.

## 4.20.4 Summary of Mitigation Measures

The mitigation measures imposed by the Energy Commission as Conditions of Certification for the GSEP would avoid or reduce impacts on the quality of the human environment. These mitigation measures are set forth in Appendix G. The following mitigation measures would avoid or minimize impacts on wildland fire ecology:

BIO-6, BIO-7, BIO-8, BIO-14, BIO-19, BIO-24

## 4.20.5 Residual Impacts after Mitigation Measures were Implemented

Despite the mitigating measures which would be incorporated into the Proposed Action and its alternatives, the changes in vehicle use, i.e, site access for construction, operation, and maintenance and recreational vehicle access would increase the threat of wildfires in the area surrounding the GSEP to a slight, but unknown degree.

## 4.20.6 Unavoidable Adverse Impacts

The residual impacts described above would be unavoidable consequences of development.

# 4.21 Impacts on Wildlife Resources

## 4.21.1 Impact Assessment Methodology

This analysis is based, in part, upon information from the following sources: the Application for Certification (AFC) (GSEP 2009a); Data Adequacy Supplement (GSEP 2009c) and Data Adequacy Supplement 1A (GSEP 2009d); responses to CEC staff data requests (GSEP 2009f, TTEC 2010f); CEC staff workshops held on November 23 and 24, December 18 and 31, 2009 and January 6, 11, and 12, February 10 and 18, 2010, April 19, 20, and 21 and May 5, 2010; site visits by CEC staff on October 27, 2009, December 10, 2009, January 12 and February 25, 2010; the Applicant's December 2009 Notification of a Lake or Streambed Alteration (TTEC 2009d) revisions to the Notification of a Lake or Streambed Alteration (TTEC 2010j, TTEC 2010l); the applicant's Aeolian Transport Evaluation and Ancient Shoreline Delineation Report for the GSEP (Worley Parsons 2010c); the applicant's Interim Preliminary Aeolian Sand Source, Migration and Deposition Letter Report for GSEP (Worley Parsons 2010d); PWA's Geomorphic Assessment of the Genesis Solar Project Site (Soil and Water Appendix A; PWA 2010a); the Applicant's Incidental Take of Threatened and Endangered Species Permit Application (TTEC 2009c); the Applicant's draft mitigation plans including the Draft Desert Tortoise Relocation/Translocation Plan (TTEC 2010a), Draft Weed Management Plan (TTEC 2010g), Draft Revegetation Plan (TTEC 2010i), and Draft Common Raven Monitoring, Control and Management Plan (TTEC 2010k); preliminary 2010 survey data (TTEC 2010m) and other supplemental information (TTEC 2010r, TTEC 2010p); information about minor changes to the GSEP (TTEC 2010o); communications with representatives from the California Department of Fish and Game (CDFG), Bureau of Land Management (BLM), and the U.S. Fish and Wildlife Service (USFWS); and information contained within the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO). Information used to update this FEIS section is found in an updated Biological Resources Technical Report that includes findings from spring, 2010, surveys (TTEC 2010p)and the Revised Staff Assessment Supplement from the CEC. Additionally, golden eagle survey results from spring, 2010 and a golden eagle risk assessment, became available in time for preparation of this FEIS (TTEC 2010U; TTEC 2010v).

## 4.21.2 Discussion of Direct and Indirect Impacts

### Proposed Action

Direct impacts are those resulting from a project and occur at the same time and place. Indirect impacts are caused by a project, but can occur later in time or farther removed in distance while still reasonably foreseeable and related to the project. The potential impacts discussed in this analysis are those most likely to be associated with construction and operation of the GSEP.

Impact analyses typically characterize effects to plant communities as temporary or permanent, with a permanent impact referring to areas that are paved or otherwise precluded from restoration to a pre-project state. In the desert ecosystems the definition of permanent impacts needs to reflect the slow recovery rates of its plant communities. Natural recovery rates from disturbance

in these systems depend on the nature and severity of the impact. For example, creosote bushes can resprout a full canopy within five years after damage from heavy vehicle traffic (Gibson et al. 2004), but more severe damage involving vegetation removal and soil disturbance can take from 50 to 300 years for partial recovery; complete ecosystem recovery may require over 3,000 years (Lovich and Bainbridge 1999). In this analysis, an impact is considered temporary only when there is evidence to indicate that pre-disturbance levels of biomass, cover, density, community structure, and soil characteristics could be achieved within five years.

## *Desert Tortoise*

Direct impacts include potential take of individuals during operation and construction; permanent loss of occupied desert tortoise habitat, designated critical habitat, and fragmentation of surrounding habitat.

Indirect impacts include increased risk of predation from ravens, coyotes, feral dogs; disturbance from increased noise and lighting; introduction and spread of weeds; increased road kill hazard.

### Direct Impacts

During construction of the GSEP desert tortoises may be harmed during clearing, grading, and trenching activities or may become entrapped within open trenches and pipes. Construction activities could also result in direct mortality, injury, or harassment of individuals as a result of encounters with vehicles or heavy equipment. Other direct effects could include individual tortoises being crushed or entombed in their burrows, collection or vandalism, disruption of tortoise behavior during construction or operation of facilities, disturbance by noise or vibrations from the heavy equipment, and injury or mortality from encounters with worker's or visitor's pets. Desert tortoises may also be attracted to the construction area by application of water to control dust, placing them at higher risk of injury or mortality. Increased human activity and vehicle travel would occur from the construction and improvement of access roads, which could disturb, injure, or kill individual tortoises. Also, tortoises may seek shade by taking shelter under parked vehicles and be killed, injured, or harassed when the vehicle is moved.

The Applicant has recommended impact avoidance and minimization measures to reduce these direct impacts to desert tortoise, including installation of exclusion fencing to keep desert tortoise out of construction areas, relocating/translocating the resident desert tortoise from the GSEP site, reducing construction traffic and speed limits to reduce the incidence of road kills and worker environmental awareness training programs.

### Impacts to Critical Habitat

The GSEP area overlaps with a portion of the 1,020,600-acre Chuckwalla Desert Tortoise Critical Habitat Unit. Critical habitat is defined as the specific areas supporting those physical and biological features that are essential for the conservation of the species and that may require special management considerations or protection (USFWS 2008a). The GSEP transmission line (2.8 miles), gas line (1 mile) and access road (1.8 miles) would intersect the edge of designated desert tortoise critical habitat (TTEC 2009c). All of the linear facilities are within the same

corridor. Critical habitat would be directly impacted by construction of these facilities (TTEC 2009cImpacts of Relocation/Translocation

Capturing, handling, and relocating desert tortoises from the proposed site after the installation of exclusion fencing could result in harassment and possibly death or injury. Tortoises may die or become injured by capture and relocation when these methods are performed improperly, particularly during extreme temperatures, or when they void their bladders. Averill-Murray (2001) determined that tortoises that voided their bladders during handling had significantly lower overall survival rates (0.81-0.88) than those that did not void (0.96). When multiple desert tortoises are handled by biologists without the use of appropriate protective measures, pathogens may be spread among the tortoises, both resident and translocated animals. For those tortoise near but not within the Project Disturbance Area, removal of habitat within a tortoise's home range or segregating individuals from their home range with a fence would likely result in displacement stress that could result in loss of health, exposure, increased risk of predation, increased intraspecific competition, and death. Tortoises moved outside their home ranges would likely attempt to return to the area from which they were moved, therefore making it difficult to isolate them from the potential adverse effects associated with GSEP construction.

The risks and uncertainties of translocation to desert tortoise are well recognized in the desert tortoise scientific community. The Desert Tortoise Recovery Office (DTRO) Science Advisory Committee (SAC) has made the following observation regarding desert tortoise translocations (DTRO 2009, p. 2):

"As such, consensus (when not unanimity) exists among the SAC and other meeting participants that translocation is fraught with long-term uncertainties, notwithstanding recent research showing short-term successes, and should not be considered lightly as a management option. When considered, translocation should be part of a strategic population augmentation program, targeted toward depleted populations in areas containing "good" habitat. The SAC recognizes that quantitative measures of habitat quality relative to desert tortoise demographics or population status currently do not exist, and a specific measure of "depleted" (e.g., ratio of dead to live tortoises in surveys of the potential translocation area) was not identified. Augmentations may also be useful to increase less depleted populations when the goal is to obtain a better demographic structure for long-term population persistence. Therefore, any translocations should be accompanied by specific monitoring or research to study the effectiveness or success of the translocation relative to changes in land use, management, or environmental condition."

The Applicant has prepared a draft Desert Tortoise Relocation/Translocation Plan as part of the Incidental Take Permit application (TTEC 2010a) which includes measures to avoid and minimize adverse impacts to resident and translocated desert tortoise. This plan would be reviewed and approved by CDFG, USFWS, and CEC staff, and would be implemented to move any tortoises detected during clearance surveys. The Desert Tortoise Relocation/Translocation Plan includes an analysis to determine whether relocation or translocation is an appropriate action; the identification and prioritization of potentially suitable locations for translocation; desert tortoise handling and transport considerations (including temperature); animal health

considerations; a description of translocation scheduling, site preparation, and management; and specification of monitoring and reporting activities for evaluating success of translocation.

### Indirect Impacts

**Ravens and Other Predators.** Construction and operations activities associated with the GSEP could provide food or other attractants in the form of trash, road-killed animals, and water, which would draw unnaturally high numbers of desert tortoise predators such as the common raven, kit fox, and coyote to the GSEP area. GSEP structures would also provide new nesting and perching sites for ravens such as new transmission line towers and perimeter fencing. Development of new elevated perching sites as a result of GSEP construction could increase raven numbers locally, including the probability that young ravens remain in the area after maturing, which, in turn, could result in increased predation on desert tortoise in the vicinity of the Project Disturbance Area.

Common raven populations in some areas of the Mojave Desert have increased 1,500 percent from 1968 to 1988 in response to expanding human use of the desert (Boarman 2002). Since ravens were scarce in this area prior to 1940, the current level of raven predation on juvenile desert tortoises is considered to be an unnatural occurrence (BLM 1990, USFWS 2008a) and one of many anthropogenic contributors to desert tortoise population declines.

In addition to ravens, feral dogs have emerged as major predators of the tortoise. Dogs may range several miles into the desert and have been found digging up and killing desert tortoises (USFWS 1994; Evans 2001). Dogs brought to the GSEP site with visitors may harass, injure, or kill desert tortoises, particularly when allowed off leash to roam freely in occupied desert tortoise habitat. The worker environmental awareness training (BIO-6) and restrictions on pets being brought to the site required of all personnel (BIO-8) would reduce or eliminate the potential for these impacts.

Construction and operation of the GSEP would increase raven and coyote presence in the GSEP area. Ravens capitalize on human encroachment and expand into areas where they were previously absent or in low abundance. Ravens habituate to human activities and are subsidized by the food and water, as well as roosting and nesting resources that are introduced or augmented by human encroachment. Road kill along I-10 provides an additional attractant and subsidy for opportunistic predators/scavengers such as ravens. Road kills would mount with increased GSEP construction and operations traffic, further exacerbating the raven/predator attractions and increasing desert tortoise predation levels.

**Increased Risk from Roads/Traffic.** Vehicle traffic would increase as a result of construction and improvement of access roads, increasing the risk of injuring or killing desert tortoise. The potential for increased traffic-related tortoise mortality is greatest along paved roads where vehicle frequency and speed is greatest though tortoises on dirt roads may also be affected depending on vehicle frequency and speed. Census data indicate that desert tortoise numbers decline as vehicle use increases and that tortoise sign increases with increased distance from roads (Nicholson 1978; Hoff and Marlow 2002). Additional unauthorized impacts that may occur from casual use of the access roads in the GSEP area include unauthorized trail creation.

### *Impacts to Wildlife from Invasive and Noxious Weeds*

Sahara mustard (*Brassica tournefortii*) is regarded as one of the most invasive wildland pest plants in the Colorado and Mojave deserts, one of the most common invasive plants in desert tortoise habitat, and capable of dominating entire desert landscapes when no control actions are taken. Left uncontrolled, it out-competes and ultimately replaces native wildflowers that provide valuable forage for the desert tortoise. It forms dense thickets that can increase the frequency, intensity, and size of desert fires, increasing the threat to native plant communities, the desert tortoise, and other wildlife (Brooks 2010 as cited in the CEC RSA June 2010). In areas where Sahara mustard is particularly dense it may also impede desert tortoise movement (Berry pers. comm. as cited in the CEC RSA June 2010). In the Colorado and Mojave Deserts, a single tortoise was necropsied that had died from renal failure, related to renal oxalosis, and the crystals present in the kidneys were identified as oxalates (Jacobson et al. 2009 as cited in the CEC RSA June 2010). One additional tortoise was later necropsied that died of oxalosis in the same region (Berry pers comm. 2010 as cited in the CEC RSA June 2010). Although many native plants in the Mojave and Colorado deserts contain oxalates, the oxalate-containing weed Sahara mustard is one of the most common invasives in desert tortoise habitat and is a suspected cause of the renal failure (Berry pers comm. as cited in the CEC RSA June 2010).

Sahara mustard spreads explosively during wet years but even during a 12-year drought in Riverside County (1989-1991), the population of Sahara mustard increased by nearly 35 times. Densities equivalent to as high as three million plants per acre have been recorded at Lake Mead National Recreation Area (Graham et al. 2003 as cited in the CEC RSA June 2010).

The spread of Sahara mustard from increased vehicle use of the area roads and from transmission construction (Berry pers comm)—its primary conduit for spread—may affect Mojave fringe-toed lizards and other wildlife by altering the availability of forage plants and characteristics of their habitat structure. For example, the Coachella Valley fringe-toed lizard (*Uma inornata*) is a dune-dependent species that requires fine, loose, windblown (aeolian) sand for survival (Zeiner et al. 1990). Much of the ephemeral sand field community within the Coachella Valley has become increasingly less fine and more gravelly over the past 25 years while there has also been a decline in Coachella Valley fringe-toed lizard populations over the past two decades (Barrows et al. 2010). Barrows et al. (2009) found the Coachella Valley fringe-toed lizard to be the only animal species of five vertebrates evaluated to demonstrate a negative response to Sahara mustard abundance.

### *Other Indirect Impacts*

In addition to construction-related introduction of invasive plants that out compete native plants, other indirect impacts to desert tortoise could result from an increased incidence of accidental wildfires. This could be caused by construction or downed new transmission wires, but the potential for this is low due to the relatively small length of transmission lines proposed as part of the GSEP. With the addition of hundreds of new jobs, there will be an increased use of area roads that can increase the risk of ignition on roadsides. Both of these impacts could reduce adjacent habitat quality for desert tortoise. Potential deposition of sediment loads as a result of

construction-related sediment mobilization during heavy rain events and flooding downstream would impact existing desert tortoise burrows outside of the Project Disturbance Area.

### *Mojave Fringe-toed Lizard*

Direct impacts include mortality to individuals during construction and permanent loss of sand dune habitat and sand drift over playa habitat; increased road kill hazard from construction traffic; potential accidental direct impacts to adjacent preserved habitat during construction and operation.

Indirect impacts include disruption of sand transport corridor resulting in downwind impacts; introduction and spread of invasive plants; erosion and sedimentation of disturbed soils; fragmentation and degradation of remaining habitat; increased road kill hazard from operations traffic; harm from accidental spraying/drift of herbicides and dust suppression chemicals.

The GSEP would directly impact stabilized/partially stabilized sand dune habitat and playa/sand drifts over playa habitat (CEC 2010d as cited in the CEC RSA June 2010). In addition to this direct and immediate loss of habitat, the GSEP would indirectly affect Mojave fringe-toed lizard habitat downwind of the Project Disturbance Area (see CEC Revised Staff Assessment Soil & Water Appendix A; PWA 2010a). As discussed above, the southwestern corner of the eastern solar array extends south into the PDL-Chuckwalla Valley Sand Transport Corridor (Worley Parsons, 2010c).

The Mojave fringe-toed lizard relies on vegetated sand dunes and a regular supply of fine wind-blown sand for its habitat. Active sand dunes (i.e., dunes that have an active layer of mobile sand) exist in a state of dynamic equilibrium, continuously losing sand downwind due to erosion and transport and gaining new supplies from upwind. When the upwind sand supply is cut off the dunes deflate, losing sand downwind and shrinking in size and depth. The finest sand (which is most easily transported) is lost first with coarser sand and gravel being left behind to form an armor or lag. This lag does not support Mojave fringe-toed lizard habitat.

As discussed above, the GSEP may also have an impact on sand transport and Mojave fringe-toed lizard habitat by eliminating the network of desert washes throughout the site and replacing them with engineered channels (CEC Revised Staff Assessment Soil & Water Appendix A). GSEP construction on the alluvial fans and alteration of stream channels by channelization may reduce the amount of fluvial sediment reaching the depositional areas upwind of sand dunes and Mojave fringe-toed lizard habitat. Similar effects have been observed in the Coachella Valley, with adverse consequences for Coachella Valley fringe-toed lizard habitat (Griffiths et al. 2002). The extent of the GSEP impact to fluvial sand transport is unknown, but is expected to contribute at least incrementally to loss of Mojave fringe-toed lizard habitat.

Other potential indirect impacts of the GSEP to Mojave fringe-toed lizards include mortality from vehicle strikes; introduction and spread of invasive plants; erosion and sedimentation of disturbed soils; fragmentation and degradation of remaining habitat; increased road kill hazard from operations traffic; harm from accidental spraying or drift of herbicides and dust suppression

chemicals; and an increase in access for avian predators (such as loggerhead shrikes) due to new perching structures.

The distribution of Mojave fringe-toed lizards is naturally fragmented because of its obligate habitat specificity to a patchy habitat type, and many local populations of this species are quite small, with small patches of sand supporting small populations of lizards. This fragmented pattern of distribution leaves the species vulnerable to local extirpations from additional habitat disturbance and fragmentation (Murphy et al. 2007). The Mojave fringe-toed lizard population in the Chuckwalla Valley, along with a very small population in Joshua Tree National Park's Pinto Basin, represents the southernmost distribution of this species (Barrows pers. comm.). This southern population may represent an important gene pool in light of the likely warming and drying that will occur in this region as a result of climate change; these southernmost lizards that may already be adapted to hotter and drier conditions than those further north and could represent a source of genetic variation that could stave off extinction of this species in selected refugia (Barrows pers. comm.). The direct and indirect effects of the GSEP to the Chuckwalla Valley Mojave fringe-toed lizard population would be substantial. Indirect effects include the reduction in sand supply to the sand transport corridor from alteration of GSEP area drainages as well as the sand shadow effect resulting from intrusion of the GSEP into the sand transport corridor.

### *Couch's Spadefoot Toad*

Direct impacts include loss of breeding and upland habitat, mortality of individuals; disturbance to breeding ponds,

Indirect impacts include reduced flow to breeding areas, increased flow to upland habitat, construction noise could trigger emergence when conditions are not favorable.

Couch's spadefoot toads were recorded breeding in a pond south of I-10 near Wiley Well Road (Dimmitt 1977) that apparently overlaps with the GSEP's proposed transmission line corridor; in the absence of survey information indicating otherwise, we consider this species to be extant at this location. Couch's spadefoot toads require aquatic habitat for breeding and upland habitat for burrowing. This species does not breed every year, and therefore potential breeding habitat does not necessarily need to sustain surface water for an extended period of time (minimum approximately 9 days) every year. Burrowing habitat is considered any area with friable soil within the adult or juvenile dispersal distance for this species. This dispersal distance is largely unknown, though there is one record from Mayhew (1965) of a juvenile 0.25 miles from the closest breeding pond. Therefore, in the absence of more conclusive information, upland Couch's spadefoot toad habitat is considered to be all areas with friable soils within 0.25 miles of a potential breeding pond and other observations place them at least one mile from ponds (Dimmitt, pers. comm.). While little is known about the location and proximity of subterranean refuge sites, there is some indication that they are widely distributed and that breeding pond habitat is the limiting factor in their distribution (Dimmitt, pers. comm.).

Impacts to Couch's spadefoot toads could include loss of breeding habitat and direct mortality during grading or construction. Disturbance to breeding ponds, including new ponds incidentally

created during construction activities, could also impact this species. In addition, construction, maintenance, and operation traffic could result in direct mortality on GSEP area roads. Indirect impacts could result from hydrology changes that reduce flow to breeding areas. In addition, construction noise could trigger emergence when conditions are not favorable. As discussed above, the GSEP transmission line corridor overlaps a recorded breeding site. While the exact location of the breeding pond is unknown, a review of aerial photos and a site visit identified a pond southwest of the intersection of Wiley Well Road and I-10 the area mapped in Dimmitt (1977). In addition, CEC staff has reviewed aerial photos of the linear route and solar facility site north of I-10. CEC staff agrees with the Applicant that it is unlikely the solar facility site supports breeding pond habitat thought it may provide habitat for subterranean burrows when there is a breeding pond within dispersal distance. CEC staff has identified areas along the linear route, however, that need further study to determine whether these areas are capable of sustaining surface water and therefore provide breeding habitat.

Without species-specific survey results and with limited occurrence information, it is difficult to assess the potential for direct and indirect impacts to Couch's spadefoot toads. However, based on a known occurrence in the GSEP area, and surface water visible in GSEP aerials and verified in the field, the pond southwest of Wiley Well Road and I-10 is breeding habitat for Couch's spadefoot toad. Further, based on a review of aerial photography CEC staff believes that additional breeding habitat for this species may occur north of I-10 along the proposed linear facility route.

The GSEP is located at the western border of the Couch's spadefoot toad range. The impacts to one of the few known breeding ponds for this species at the western boundary of its range would be a substantial impact. Construction activities could avoid the known breeding pond south of I-10 near Wiley Well Road. The Protection and Mitigation Plan would provide detailed guidance to implement the protection of the I-10 pond during GSEP construction and operation, and would extend that protection to any other ponds detected during habitat surveys conducted north of I-10 along the linear corridor.

### *Western Burrowing Owl*

Direct impacts include permanent loss of foraging habitat; potential loss of eggs and young; degradation and fragmentation of remaining adjacent habitat from edge effects; disturbance of nesting and foraging activities for nesting pairs near the plant site and linear facilities. The Secondary Access Road, Distribution-Telecommunication Line, Redundant Telecommunications Line, and 6-pole transmission line extension could cause similar impacts as the other linear facilities mentioned above, although these features would occur along other linear disturbances or would add very few acres of impact.

Indirect impacts include increased road kill hazard from operations traffic; potential collision with mirrors; increased predation from ravens; disturbance of nesting activities from operations.

The 2009 biological field surveys indicated two burrowing owls were present within the GSEP area and burrowing owl sign (burrows, whitewash, feathers, and pellets) was observed at several

locations throughout the GSEP area (GSEP 2009a, Appendix C). However, the 2009 surveys did not reveal the presence of burrowing owls or active burrows within in the Project Disturbance Area. Since owls and owl sign were found just outside of the Project Disturbance Area, there is some potential for burrowing owls to move into GSEP site to nest, and therefore could be directly impacted. In addition, burrowing owls near but not within construction areas could be impacted during construction activities. The potential for direct impacts to burrowing owl includes the loss of nest sites, eggs, and/or young (unless the birds are evicted prior to construction); permanent loss of breeding and foraging habitat; and disturbance of nesting and foraging activities for burrowing owl pairs within the GSEP site, buffer, or immediately surrounding area. Indirect impacts to burrowing owls during construction and operation can include increased road kill hazards, modifications to foraging and breeding activities, and loss of prey items and food sources due to a decreased number of fossorial mammals.

Burrowing owls detected nesting within the Project Disturbance Area, would need to be relocated prior to or after the nesting season to avoid direct impacts. There is much debate among state, federal, local, and private entities over the most practicable and successful relocation/translocation methods for burrowing owl. When passive relocation is used solely as an impact avoidance measure, it is generally only effective when burrowing owl nesting territories are directly adjacent to permanently protected lands (i.e., military reservation, airport, wildlife reserve, agricultural reserve with appropriate crop type such as alfalfa) (Bloom 2003). Passive relocation has been criticized as a relocation method because relocated or displaced owls are tenacious about returning to their familiar burrows and are inclined to move back to the impact site when the impact site is still visible to the owl and/or when the impact site is not completely graded (Bloom pers. comm.). Burrowing owls are put at increased risk when they are introduced to a new environment. The owls are naturally preyed upon by numerous diurnal and nocturnal avian and mammalian species and evicting owls from their familiar burrow, territory, and home range without a safe opportunity to become familiar with their new habitat increases the potential for predation (Pagel pers. comm.). Thus, many burrowing owls likely die during passive relocations used for permanent owl eviction.

For successful active or passive relocation, breaking the owl's site fidelity is of utmost importance (Bloom 2003). The off-site location for the relocated owls should ideally have an existing burrowing owl colony and a large ground squirrel colony. Should neither colony already exist at the translocation site, artificial burrows should be installed (Bloom 2003). Active translocation of owls involves trapping owls, temporarily holding them in enclosures with supplemental feeding, and releasing at a suitable off-site location with existing or artificial burrows prior to breeding.

### *Golden Eagle*

Direct and indirect impacts include loss of foraging habitat. Golden eagles can be extremely susceptible to disturbance during the breeding season (Anderson et al. 1990; USFWS 2009b), and adverse effects are possible from various human activities up to (and in some cases exceeding) one mile from a nest site (Whitfield et al. 2008). However, due to the distance of the GSEP from the surveyed nest sites (approximately 9 miles) and the fact that they are out of the line-of-sight, disturbance impacts due to construction or operation are not expected (TTEC 2010q). The GSEP

would reduce the availability of foraging habitat in the GSEP area and could degrade foraging habitat by the introduction and spread of noxious weeds and an increase in human activity in the area. However the amount of habitat impacted within the 10 mile range from each nest is less than one percent and other habitat is comparable or better than the impacted habitat for eagle prey (TTEC 2010q).

Other potential causes of golden eagle mortality include collisions with the solar facilities, transmission lines, and electrocution. However, mortality is unlikely due to collisions with the solar facilities because of the lack of prey, and therefore hunting eagles, in the immediate vicinity of the operational facility. Mortality risk is low due to electrocutions at transmission lines because lines will follow American Power Line Interaction Committee guidelines (see discussion on electrocution under Additional Operational Impacts). The BLM is consulting with the FWS to determine whether construction and operation of the GSEP would be likely to take eagles. If so, then the FWS must determine whether an Avian Protection Plan (APP) would sufficiently minimize impacts to eagles. If the FWS indicates that an APP is not sufficient to avoid or minimize likely take resulting from the Proposed Action, the BLM authorized officer will not issue a Record of Decision or Decision Record approving the project. If the Applicant wishes to proceed, the Applicant must then identify an alternative project design to reduce the likely take to a level that is compatible with the preservation of eagles, and receive FWS concurrence for the revised APP. If, after coordination with the FWS, an APP is deemed appropriate and needed to sufficiently avoid and minimize take by the Proposed Action, the BLM authorized officer may issue a Record of Decision approving the project; however, the BLM authorized officer will not issue a Notice to Proceed until the FWS letter of concurrence for the APP is received for the project.

### *Migratory and Special-status Bird Species*

Direct impacts include permanent loss of breeding and foraging habitat, including Sonoran creosote bush scrub and microphyll woodland; potential loss of eggs and young; disturbance of nesting and foraging activities for populations on and near the plant site and linear facilities; degradation and fragmentation of remaining adjacent habitat from edge effects. The Secondary Access Road, Distribution-Telecommunication Line, Redundant Telecommunications Line, and 6-pole transmission line extension could cause similar impacts as the other linear facilities mentioned above, although these features would occur along other linear disturbances or would add very few acres of impact.

Indirect impacts include increased road kill hazard from operations traffic and collision with mirrors; increased predation from ravens; disturbance from operations.

Several special-status species, such as black-tailed gnatcatchers, yellow warblers, and crissal thrashers, breed in the region, but would not breed on the site due to lack of suitable habitat. This region does not provide breeding habitat for Swainson’s hawks, northern harriers, short-eared owls, ferruginous hawks, or Brewer’s sparrows but may provide overwintering habitat or the species may be present during migration. The GSEP impacts to Sonoran creosote bush scrub and microphyll woodland would contribute to loss of foraging habitat, cover, and roost sites for these

species on their migratory or wintering grounds, but would not contribute to loss of breeding habitat. The GSEP would have more substantial adverse effects to the resident breeding birds at the site, which include loggerhead shrike, California horned lark, and Le Conte's thrasher among others. These species would be adversely affected by the loss of microphyll woodland and Sonoran creosote bush scrub. Le Conte's thrasher, loggerhead shrikes and other wash-dependent species would in particular be affected by the loss of the cover, foraging and nesting opportunities provided by the structurally diverse and relatively lush dry washes and microphyll woodland. Dry washes contain less than five percent of the Sonoran Desert's area, but are estimated to support ninety percent of Sonoran Desert birdlife (CalPIF 2006). The loss of active bird nests or young is regulated by the federal Migratory Bird Treaty Act and Fish and Game Code section 3503, which protects active nests or eggs of California birds.

### *Bats*

The GSEP site supports foraging and roosting habitat for several special-status bat species. Roosting opportunities for bats are available in tree cavities, soil crevices and rock outcroppings primarily within dry desert wash woodland habitats. Bats likely utilize habitats throughout the GSEP area for foraging but forage more commonly when water is present within the desert washes when insects are more abundant. Implementation of the GSEP would result in loss of these foraging and roosting habitat opportunities for special-status bats that might occur in the GSEP area.

### *American Badger and Desert Kit Fox*

Direct impacts include permanent loss of foraging and denning habitat; fragmentation and degradation of remaining habitat, loss of foraging grounds, crushing or entombing of animals during construction; increased risk of road kill hazard from construction traffic.

Indirect impacts include disturbance from increased noise and lighting; introduction and spread of weeds; increased risk of road kill from operations traffic.

Construction of the GSEP could kill or injure American badgers by crushing with heavy equipment or could entomb them within a den. Construction activities could also result in disturbance or harassment of individuals. Like badgers, desert kit fox are burrow dwellers and are similarly at risk of death or injury from construction activities. The desert kit fox is not a special-status species, but it is protected under Title 14, California Code of Regulations (section 460), and potential impacts to individuals of this species must be avoided. Badger burrows and kit fox burrow complexes were detected within the Project Disturbance Area, and the site includes suitable foraging and denning habitat for these species. Construction activities could also result in disturbance or harassment of individuals. The Secondary Access Road, Distribution-Telecommunication Line, Redundant Telecommunications Line, and 6-pole transmission line extension could cause similar impacts as the other linear facilities, reducing available habitat, increasing the threat of mortality due to vehicle collisions, although these features would occur along other linear disturbances or would add very few acres of impact.

The GSEP would permanently remove foraging and denning habitat for American badgers and kit foxes and would fragment and reduce the value of foraging and denning habitat adjacent to the

GSEP site. This habitat loss and degradation could adversely affect American badger and kit fox populations within the NECO Planning Area.

### *Nelson's Bighorn Sheep*

The GSEP site is south of a bighorn sheep connectivity corridor between the Palen and McCoy Mountains, identified in the NECO (BLM CDD 2002). However because the distance from the mountain ranges, and the width of the valley at the GSEP site, the GSEP site is not expected to be an important movement corridor for this species. The Society for Conservation of Bighorn Sheep has recommended a one mile buffer from the upper edge of any solar development to the base of the mountains to protect spring foraging habitat. The GSEP site is over one mile from the base of either the McCoy Mountains or Palen Mountains, and the GSEP site is not expected to provide spring foraging habitat.

Also of interest are the potential impacts from GSEP groundwater extraction to seeps, springs, or other water resources that are currently available to bighorn sheep that occupy the Palen Mountains or could occupy the McCoy Mountains in the future. The Applicant has provided information (GSEP 2009f) about the closest water features, and has concluded that groundwater extraction for the GSEP would not affect these features. After reviewing the data provided in the Data Responses, the GSEP is unlikely to affect springs and seeps available for use by bighorn sheep.

The GSEP site does not represent substantial direct or indirect impacts to bighorn sheep habitat connectivity or foraging. Bighorn sheep may be impacted by construction noise, as discussed in the Construction Noise subsection.

## Additional Operation Impacts

### *Operation Lighting*

Collision hazards at the GSEP site would include several ancillary buildings (e.g., water treatment building, administration building, control room, steam turbine generator building) that range in height from 30 to 50 feet. The structures would be located within the power block, approximately in the center of each solar field and surrounded by solar arrays. The solar collection assemblies would vary in height depending on their position while tracking the sun; the tallest configuration would be approximately 25 feet tall. The tallest proposed structures are the transmission line monopoles, which are approximately 75 feet tall.

Operation of the GSEP would require onsite nighttime lighting for safety and security at the site. Existing sources of artificial lighting at night in the GSEP vicinity include intermittent vehicles traveling along Interstate 10 as well as fixed light sources at the California State Prisons south of I-10 at the Wiley's Well Road Exit and at the Wiley's Well Rest Stop. Given the lack of night lighting in this remote area, the overall change in ambient lighting conditions at the GSEP site may be substantial when viewed from nearby offsite locations. Night lighting close to the ground at the GSEP site could disturb the resting, foraging, or mating activities of wildlife and make wildlife more visible to predators.

To reduce lighting impacts, the applicant proposed several design features (GESP 2009a, Visual Design Feature 5). Lighting at the facility would be restricted to areas required for safety, security, and operation. Exterior lights would be shielded and oriented to focus illumination on the desired areas and minimize additional nighttime illumination in the site vicinity (GESP 2009a). Switched lighting would be provided for areas where continuous lighting is not required for normal operation, safety, or security. Implementation of these applicant-proposed measures would allow areas surrounding the GSEP to remain un-illuminated (dark) most of the time, thereby minimizing the amount of lighting potentially visible off site and minimizing the potential for lighting impacts to proximate wildlife. These features have been incorporated into Condition of Certification VIS-3 (Temporary and Permanent Exterior Lighting) and BIO-8. Bird collisions occurring at night would be less than substantial and no mitigation is proposed.

### *Collisions*

Bird collisions with structures typically result when the structures are invisible (e.g., bare power lines or guy wires at night), deceptive (e.g., glazing and reflective glare), or confusing (e.g., light refraction or reflection from mist) (Jaroslow 1979). Collision rates generally increase in low light conditions, during inclement weather (e.g., fog, which is rare in the desert), during strong winds, and during panic flushes when birds are startled by a disturbance or are fleeing from danger, or diving after prey. Numerous golden eagle fatalities have been documented near transmission lines where collisions apparently occurred from striking unmarked wires while diving for prey (Kerschner pers. comm.).

Lighting plays a substantial role in collision risk because lights can attract nocturnal migrant songbirds and major bird kill events have been reported at lighted communication towers (Manville 2001) with most kills from towers taller than 300 to 500 feet (Kerlinger 2004). Many of the avian fatalities at communication towers and other tall structures have been associated with steady-burning, red incandescent L-810 lights, which seem to attract birds (Gehring et al. 2009). Longcore et al. (2008) concluded that use of strobe or flashing lights on towers resulted in less bird aggregation, and, by extension, lower bird mortality, than use of steady-burning lights.

As described above, operation of the GSEP would require onsite nighttime lighting for safety and security at the site. The transmission line support structures would not be lit and no red incandescent lighting is proposed.

However, relative to nighttime collisions with lighted facilities, the risk of bird collisions and other injuries from solar facilities during daytime is unstudied. In particular, bird response to glare from the proposed solar trough technology is not well understood. Although the proposed GSEP facilities are significantly shorter than 350 feet (the height above which is considered a collision danger for migrating birds), there is concern that the mirrors may appear to a bird as a no-hazard flight area. The mirrors reflect light and take on the color of the image being reflected (Ho et al. 2009). When viewed from an angle near the current direction of the sun, at a distance or an elevated position, the solar field at its most reflective point may appear like a waterbody or lake (GSEP 2009a). Diurnal birds could also be at risk of injury and fatality from burns when they flew into the reflected sunlight between parabolic troughs or landed on the collector tubes of heat transfer fluid.

The risk of such impacts is probably low, although very little research has been conducted on the risks of bird collisions at solar facilities. The only such research available is the bird fatality studies at the Solar One facility near Daggett, San Bernardino County (McCrary et al. 1986). Results of that study indicated that much of the bird mortality consisted predominantly of collisions with mirrors, in large part resulting from increased numbers of birds attracted to the adjacent evaporation ponds and agricultural fields. For the GSEP, without such a nearby attractant, bird numbers, and hence likelihood of bird collisions, would be low.

Although CEC staff does not think it likely that mirrors and other structures within the Project Disturbance Area pose a significant collision risk to resident or migratory birds at the GSEP site, there is insufficient information available to conclude with certainty that the GSEP would not be an ongoing source of mortality to birds for the life of the GSEP.

### *Lighting – Glare*

The proposed solar mirrors and heat collection elements (HCEs or receiver tubes) are sources of bright light caused from the diffuse reflection of the sun. Glint and glare studies of solar trough technology found that pedestrians standing within 20 meters (60 feet) of the perimeter fence when the mirrors rotate from the stowed position to a vertical position may see a light intensity equal or greater to levels considered safe for the human retina (URS 2008). Any wildlife on the ground at a distance of 20 meters or closer could experience similar hazards from unsafe light intensity. Slatted fencing is recommended in the Visual Resources section of this analysis to mitigate the problem of bright spots on motorists.

### *Electrocution*

Large raptors such as golden eagle, red-tailed hawk, and great horned owl, can be electrocuted by transmission lines when the bird's wings simultaneously contact two conductors of different phases, or a conductor and grounded hardware. This happens most frequently when a bird attempts to perch on or take off from a structure with insufficient clearance between these elements. The majority of bird electrocutions occur on distribution lines between 1- and 60-kV; however, configurations greater than 60 kV typically do not present an electrocution potential because phase-to-phase and phase-to-ground clearances for lines greater than 60-kV are typically sufficient to prevent bird electrocution (APLIC 2006). The proposed transmission lines would be 230 kV; therefore, phase-to-phase and phase-to-ground clearances are expected to be sufficient to avoid bird electrocutions.

Potential impacts to wildlife resulting from electrocution by transmission lines would be minimized by incorporating the construction design recommendations provided in Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006 (APLIC 2006). Specifically, the phase conductors shall be separated by a minimum of 60 inches and bird perch diverters and/or specifically designed avian protection materials should be used to cover electrical equipment where adequate separation is not feasible (APLIC 2006).

### *Evaporation Ponds*

The proposed GSEP includes six, eight-acre evaporation ponds that would collect blowdown water from the cooling towers (GSEP 2009a). A variety of waterfowl and shorebirds seasonally inhabit or utilize evaporation ponds as resting, foraging, and nesting areas. Evaporation ponds in the Sonoran Desert pose several threats to wildlife. First, creation of a new water source to an area where water is scarce would attract ravens to the GSEP, potentially increasing predation rates on juvenile desert tortoise in adjacent habitat. Second, waterfowl, shorebirds, and other resident or migratory birds that drink or forage at the ponds could be harmed by selenium or hyper-saline conditions resulting from high total-dissolved-solids concentrations (EPTC 1999; Lemly 1996; Windingstad et al. 1987). CEC staff, CDFG, and USFWS are concerned about these threats to wildlife posed by the evaporation ponds.

Dry cooling is being evaluated as an alternative to wet cooling (refer to the Alternatives section, chapter 2) and zero liquid discharge (ZLD) remains a viable wastewater disposal alternative to evaporation ponds. These alternatives would eliminate impacts from wildlife exposure to the evaporation ponds and is recommended by CEC staff, CDFG, and USFWS.

## Alternatives

Two alternatives to the Proposed Action other than the No Action/No Project Alternatives, the Reduced Acreage Alternative and the Dry Cooling Alternative were considered. Direct and indirect impacts from the Proposed Action and both alternatives are similar (aside from differences in impact acreage) for most wildlife resources, including impacts to desert tortoise habitat, Couch's spadefoot toad, microphyll woodland, and migratory birds. While impacts from the Reduced Acreage Alternative are substantially less to Mojave fringe-toed lizard habitat and desert washes, these impacts would still be considered substantial under this alternative as well as under the Proposed Action and Dry Cooling Alternative.

Direct and indirect impacts from the Proposed Action and both alternatives would be similar (aside from differences in impact acreage) for most wildlife resources, including impacts to desert tortoise habitat, Couch's spadefoot toad, and migratory birds (Table 4.21-1). While impacts from the Reduced Acreage Alternative are substantially less to Mojave fringe-toed lizard habitat and desert washes, these impacts would still be considered substantial under this alternative as well as under the Proposed Action and Dry Cooling Alternative.

### *Dry Cooling Alternative*

Because this alternative would occupy the same footprint as the Proposed Action, the impacts remain the same between the two except for impacts to groundwater-dependent ecosystems. The Dry Cooling Alternative would use over 87 percent less groundwater than the Proposed Action. Indirect impacts to groundwater-dependent ecosystems under the Proposed Action are expected to be substantial when the water tables drop below the baseline spring water table levels necessary for healthy ecological functioning. Under the Dry Cooling Alternative, impacts to groundwater-dependent vegetation would not be substantial.

**TABLE 4.21-1**
**COMPARISON OF DIRECT AND INDIRECT IMPACTS TO WILDLIFE RESOURCES BY ALTERNATIVE**

| Resource | Proposed Action (Acres) | Dry Cooling (Acres) | Reduced Acreage (Acres) | No Action/No Project A, B, C (Acres) |
|---|---|---|---|---|
| Desert Tortoise Habitat – Direct Impacts | | | | |
| Within DWMA/Critical Habitat | 24 | 24 | 24 | 0 |
| Outside Critical Habitat | 1,750 | 1,750 | 1,016 | 0 |
| ***Total Desert Tortoise*** | ***1,774*** | ***1,774*** | ***1,039*** | ***0*** |
| Mojave Fringe-toed Lizard Stabilized/Partially Stabilized Sand Dunes – Direct Impacts | | | | |
| Direct Impacts | 7.5 | 7.5 | **1.3** | **0** |
| Playa and Sand Drifts Over Playa | | | | |
| Direct Impacts | 38 | 38 | 44 | 0 |
| Indirect Impacts to MFTL Habitat | 151 | 151 | 0 | 0 |
| ***Total Mojave Fringe-toed Lizard*** | ***196.5*** | ***196.5*** | ***45.3*** | ***0*** |
| **Special Status & Migratory Birds (Sonoran Creosote Bush Scrub + Desert Dry Wash Woodland)** | **1,789** | **1,789** | **1,032** | **0** |

NOTES:

a From Application for Incidental Take Permit (TTEC 2009c).
b From CEC 2010d (TetraTech table "Anticipated Direct and Indirect Impacts to Vegetation Communities"); includes impacts to Sonoran creosote bush scrub.
c From CEC 2010d; includes direct permanent impacts to stabilized and partially stabilized sand dunes and sand drifts over playas.
d From CEC Revised Staff Assessment **Soil & Water Appendix A**, calculation of the downwind impacts to Mojave fringe-toed lizard habitat from Project intrusion into sand transport corridors.
e From TTEC 2010l (TetraTech memo "Revisions to Jurisdictional Waters for the Genesis Solar Energy Project").
f From Appendix D, Lake and Streambed Alteration Agreement Application (TTEC 2009d).
g From TTEC 2010o (Tetra Tech memo "Minor Changes to the Genesis Solar Energy Project Description: 6-pole Extension of Transmission Line; Inclusion of Distribution and Telecommunications Line; Removal of "Toe" Area from Plant Facility").
h PWA 2010a. (tn pending) PWA memo "Genesis Solar Energy Project, Analysis of Impacts to Sand Transport Corridor")...
* Reflects changes Also, the removal of the 'toe' from the plant site footprint would also reduce impact acreage to state waters; however these reduced impact calculation have not been provided to date and therefore, are not included in this table.
i Revised per TTEC 2010s (Supplemental Information Genesis Solar Energy Project June 18, 2010) to include 6.5 acres of impact to sand dunes from the six-pole extension of the gen-tie line north of the Colorado River Substation. Acreage of 3.2 acres of impact from construction of distribution/telecommunications line is not yet included here or in the Sonoran creosote scrub, pending clarification regarding the upland habitat types that will be impacted by the distribution/telecommunications line.
j Revised per TTEC 2010s (Supplemental Information Genesis Solar Energy Project June 18, 2010) to reduce the impact to state waters by 21 acres, reflecting elimination of the 41.4 acre "toe" at the easternmost solar field.
k Includes one additional acre of direct impact (rounded up from 0.84 acre) due to construction of the distribution/telecommunications line.

The direct and indirect impacts from the Proposed Action to desert tortoise habitat, Couch's spadefoot toad, microphyll woodland, and migratory birds would be the same as the impacts to these resources under the Dry Cooling Alternative.

The GSEP would directly impact 38 acres of Mojave fringe-toed lizard habitat (including 1 acre of dunes and 37 acres of playa with sand drifts) and indirectly affect 151 acres of habitat downwind of the Project Disturbance Area. The indirect impact results from the GSEP solar arrays extending into the sand transport corridor, diminishing the input of sand to downwind areas and reducing the active sand layer that is crucial to Mojave fringe-toed lizard habitat. The Mojave fringe-toed lizards in the Chuckwalla Valley are at the southernmost portion of the

species range, and the proposed GSEP could increase the risks of local extirpation of an already fragmented and isolated population. Reduced Acreage Alternative

The smaller Reduced Acreage Alternative would have fewer impacts on many of the wildlife resources within the GSEP area, including desert tortoise habitat, and migratory birds. The Reduced Acreage Alternative would have substantially less impact on Mojave fringe-toed lizard habitat both because of a decrease in impacts to stabilized and partially stabilized sand dunes and because the Reduced Acreage Alternative does not extend into the sand transport corridor, and therefore has no indirect downwind impact to sandy habitats outside of the Disturbance Area (Table 4.21-1). Because the linear facilities for the Proposed Action and the Reduced Acreage Alternatives share the same route, impacts associated with this corridor are very similar. Impacts to Couch's spadefoot toad and microphyll woodland remain the same for both the Proposed Action and this alternative for this reason. In addition, although the Reduced Acreage Alternative does represent fewer acres of impacts, it is the same overall length as the Proposed Action, and therefore indirect impacts to desert washes that currently flow through the area remain similar.

Direct and indirect impacts from the Proposed Action and the Reduced Acreage Alternative are similar (aside from differences in impact acreage) for most impacts associated with the Proposed Action including impacts to desert tortoise habitat, Couch's spadefoot toad, microphyll woodland, and migratory birds. While impacts from the Reduced Acreage Alternative are substantially less to Mojave fringe-toed lizard habitat and desert wash, these impacts would still be considered substantial under this alternative as well as under the Proposed Action and Dry Cooling Alternative.

### *No Action Alternative A*

No action on proposed Action application and on CDCA land use plan amendment

Under this alternative, the Proposed GSEP would not be approved by the Energy Commission and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site, and no impacts to sensitive wildlife resources. However, the land on which the GSEP is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of the GSEP, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects may have some similar impacts in other locations.

### *No Project Alternative B*

No action on proposed Action application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the Proposed Action would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, new impacts to wildlife resources would not occur, as such, this No Project Alternative would not result in impacts to wildlife resources that would occur under the Proposed Action. However, in the absence of the GSEP, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects may have some similar impacts in other locations.

### *No Project Alternative C*

No action on proposed Action application and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the Proposed Action would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As a result, sensitive wildlife resources would be impacted from the Proposed Action. Different solar technologies require different amounts of land, placement, grading and maintenance; however, it is expected that all the technologies would require a large use of land. As such, this No Project Alternative could result in biological resource impacts similar to the impacts under the Proposed Action.

## 4.21.3 Discussion of Cumulative Impacts

Cumulative impacts would vary by alternative only to the degree to which direct and indirect impacts would vary by alternative.

Construction and operation of the GSEP will have effects on a number of wildlife resources that are individually limited but cumulatively considerable. The cumulative effects analysis employed a quantitative, GIS-based analysis of direct impacts to habitat, and a qualitative analysis of indirect effects (e.g., increases in predators, noxious weeds, etc.). In many cases, the anticipated indirect effects are more substantial, or adverse, than the direct loss of habitat, but are more difficult to quantify. Geographic scope varied between wildlife resources, but most analyses were based on the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) boundaries (BLM CDD 2002).

Substantial cumulative effects (including indirect effects) were identified in a number of biological resource areas where the GSEP contributes—at least incrementally—to the cumulative effect. These include: desert washes in the Ford Watershed and the broader NECO planning area; desert tortoise habitat; golden eagle foraging habitat; Mojave fringe toed lizard and their habitat; habitat for American badger, desert kit fox, and burrowing owl; LeConte's thrasher habitat; Couch's spadefoot toad range; habitat for Harwood's milk-vetch and other dune/playa-dependent special-status plants; wildlife habitat and connectivity within the Palen-Ford WHMA (for Mojave fringe toed lizard, dunes, and playa); Mojave and Sonoran creosote bush scrub; desert dry wash woodland (microphyll woodland); playa and sand drifts over playa, and dunes (active and stabilized). The detailed cumulative effects analysis is included in Genesis Appendix E 4-19, 4-24, Biological Resources Detailed Cumulative Effects Analysis.

Of particular concern are the cumulative effects of renewable energy projects within the geographic scope of the Chuckwalla Valley, which contains an isolated system of dunes and population of Mojave fringe-toed lizard. The direct loss of dune habitat and Mojave fringe-toed lizard is minor relative to the indirect downwind effects from obstructions within the active aeolian sand transport corridor, and the disruption of the fluvial processes that contribute sand to the system from the diversion of washes--approximately 63 miles of washes within the Chuckwalla-Ford Dry Lake watershed alone. The cumulative impact of all the proposed projects would be to increase the already fragmented distribution of the Mojave fringe-toed lizards, and to increase the risk of extirpation of isolated populations within the Chuckwalla Valley. In addition to the disruption of geomorphic processes, substantial indirect effects that can be reasonably expected to occur in the Chuckwalla system from future projects include: fragmentation and its effects on connectivity and gene flow; spread of invasive non-native plants; increase in avian predators; and an increase in vehicle-related wildlife mortality. Table 4.21-2 summarizes cumulative impacts to sensitive wildlife resources.

Ongoing collaborative efforts by federal and state agencies to develop a Desert Renewable Energy Conservation Plan and BLM's Solar Energy Development Programmatic EIS offer an appropriate forum for such planning. Appendix B describes the Desert Wildlife Management Area management strategies that could achieve the goals of preservation and enhancement of wildlife connectivity in the NECO planning area. These programmatic efforts represent an excellent means of integrating the State's and BLM's renewable resources goals and environmental protection goals.

## 4.21.4 Reasonably Foreseeable Development Scenario: Southern California Edison Colorado River Substation

This subsection provides an overview of potential impacts to biological resources from construction of Southern California Edison's (SCE's) proposed 230 kV expansion of the already-permitted (but not yet constructed) 500 kV Colorado River Substation. Unlike the transmission line that would go from the GSEP power plant to the Colorado River Substation (the "gen-tie") SCE's Colorado River Substation is not part of the GSEP description. Rather, SCE would acquire a permit from the California Public Utilities Commission, and would construct, own and operate

**TABLE 4.21-2**
**SUMMARY OF CUMULATIVE IMPACTS**

| Biological Resource | Cumulative Impact |
|---|---|
| Desert Tortoise | Contributes to cumulative loss of low to moderate value desert tortoise habitat (2.0% to 0.1 habitat value, 2.9% to 0.2 habitat value, 0.1% to 0.3 habitat value) from future projects in the NECO planning area. |
| Mojave Fringe-Toed Lizard | Contributes 0.2% to cumulative loss from future projects within the NECO planning area; contributes 1.7% to cumulative loss from future projects within the range of the Chuckwalla Valley population. |
| Couch's Spadefoot Toad | Contributes 1.6% to cumulative loss of habitat from future projects within the NECO planning area. |
| Western Burrowing Owl | Contributes 0.5% to cumulative loss from future projects within the NECO planning area. |
| Golden Eagle | Contributes 7.4% to cumulative loss of Sonoran creosote bush scrub and 0.2% to loss of dry desert wash woodland, and 0.6% to loss of sand dune foraging habitat from future projects within the NECO planning area within 10 miles of the GSEP. Contributes 0.8% to cumulative loss of Sonoran creosote bush scrub and 0.03% to loss of dry desert wash woodland, and 0.6% to loss of sand dune foraging habitat from future projects within 10 miles of the nearest mountains. |
| Special-Status Birds & Migratory Birds | Contributes 0.6% to cumulative loss of habitat from future projects within NECO planning area (Le Conte's Thrasher). |
| Desert Kit Fox & American Badger | Contributes 0.5% to cumulative loss of habitat from future projects within the NECO planning area. |
| Nelson's bighorn sheep | None |
| Bats | Loss of foraging habitat. |

NOTES:

[a] From CEC 2010d (TetraTech table "Anticipated Direct and Indirect Impacts to Vegetation Communities").
[b] From TTEC 2010l (TetraTech memo "Revisions to Jurisdictional Waters for the Genesis Solar Energy Project").
[c] From TTEC 2010j (TetraTech Notification of a Lake or Streambed Alteration Agreement Application, Appendix D).
[d] From TTEC 2009c (TetraTech Application for Incidental Take of Threatened and Endangered Species).
[e] From CEC Revised Staff Assessment Soil & Water Appendix A, calculation of the downwind impacts to Mojave fringe-toed lizard habitat from Project intrusion into sand transport corridors.
[f] From TTEC 2010o (Tetra Tech memo "Minor Changes to the Genesis Solar Energy Project Description: 6-pole Extension of Transmission Line; Inclusion of Distribution and Telecommunications Line; Removal of "Toe" Area from Plant Facility").

the Colorado River Substation to serve several projects in the area. SCE would provide an analysis of impacts to biological resources and mitigation for those impacts resulting from construction of the Colorado River Substation. However, because the proposed expansion of the Colorado River Substation is a reasonably foreseeable development, a description of the expansion and potential impacts to biological resources is included here. The purpose of the discussion in this subsection is to inform all interested parties of the potential for impacts to biological resources that may result from other actions related to the GSEP.

## Impacts to Biological Resources from Colorado River Substation Expansion

The Colorado River Substation expansion would be constructed within sand dune habitat. The basis for this inference is Figure DR-BIO-51-2 from the Data Response submitted for the Blythe Project (AECOM 2010e). This figure shows, at a scale of 1 inch = 6000 feet, the approximate location of the proposed Colorado River Substation and depicts it as being entirely within

stabilized and partially stabilized sand dune. Supporting inference that the substation expansion will be in sand dunes is the Applicant's submittal which included the 2010 preliminary survey results from the Blythe Project (TTEC 2010o, Attachment A). This submittal showed numerous records for species that occur on sand dune habitat (for example Mojave fringe-toed lizard and ribbed cryptantha) in and around the proposed Colorado River Substation location. Based on the information from the Blythe Project 2010 surveys (TTEC 2010o, Attachment A, Figure 2 - Preliminary Results Botany Rare Plants Spring 2010 Surveys, and Figure 4 - Incidental Wildlife Observations Spring 2010 Surveys and TTEC 2010p) Mojave fringe-toed lizards and a number of other sensitive sand dune-dependent species are likely to be directly impacted by expansion of the Colorado River Substation. Many Mojave fringe-toed lizards were detected in and near the proposed Colorado River Substation, as well as numerous rare plants, including Harwood's eriastrum, Harwood's milk-vetch, winged cryptantha and ribbed cryptantha.

Even when the substation expansion avoided direct impacts to these sensitive sand dune species, indirect impacts are likely to occur. Alterations in drainages could adversely affect special-status plant populations that occur downstream of the GSEP area. Other indirect effects include the spread of the non-native Sahara mustard and other non-native invasive species, which degrade sand dune habitat by prematurely stabilizing dunes. Transmission line maintenance activities and an increase in OHV use from the construction of roads into previously inaccessible areas could also adversely affect sand dune dependent plant and animal species.

No desert tortoise were detected on or within the one-mile buffer around the proposed substation site during the 2010 surveys (TTEC 2010o; TTEC 2010p), but given the proximity of good habitat in the immediate vicinity of the proposed substation desert tortoise could occur near the proposed substation expansion and could be directly or indirectly impacted. Transmission line maintenance activities and an increase in OHV use from the construction of roads into previously inaccessible areas could result in increased disturbance from human intrusions and increased risk of mortality from vehicle strikes and crushing of burrows. Construction activities and addition of new perching structures such as transmission poles and lines could result in increased raven numbers, and hence an increase in desert tortoise predation. Road construction could also increase the opportunities for non-native invasive plant species, with adverse effects to native plant and wildlife communities. Nesting birds, badger, kit fox, and burrowing owls could also be directly or indirectly affected by construction and operation of the expanded substation. We do not have information about the presence of ephemeral washes, desert dry wash woodland and other ephemeral drainages in the proposed substation expansion area. The proposed expansion and associated drainage modifications could result in direct and indirect impacts to state waters.

SCE's proposed expansion of the Colorado River Substation has the potential to result in substantial direct, indirect and cumulative impacts to biological resources, in particular for sensitive dune-dependent plant species such as Harwood's eriastrum. Implementation of appropriate mitigation measures such as those for the GSEP would avoid, minimize or compensate for many of the impacts.

## 4.21.5 Summary of Mitigation Measures

The following mitigation measures set forth in **Appendix G** would avoid or minimize impacts on wildlife resources[1]:

> BIO-1, BIO-2, BIO-3, BIO-4, BIO-5, BIO-6, BIO-7, BIO-8, BIO-9, BIO-10, BIO-11, BIO-12, BIO-13, BIO-15, BIO-16, BIO-17, BIO-18, BIO-20, BIO-21, BIO-23, BIO-27, BIO-28, BIO-29

Moreover, to address potential impact to Climate Change, the BLM would require, as discussed in Section 4.17 Vegetation, in concert with BIO-7, the following:

> **BLM BIO-7a:** The Applicant shall ensure that monitoring accomplished under BIO-7 and other mitigating measures use available climatalogical data when analyzing project effects or resource trends.

## 4.21.6 Residual Impacts after Mitigation

The GSEP would have substantial impacts to wildlife resources, eliminating all of the Sonoran creosote bush scrub and other native plant and wildlife communities within the approximately 1,800-acre site, including 90 acres of desert washes. Without mitigation the GSEP would contribute to the cumulatively substantial loss of wildlife resources within the Chuckwalla Valley and the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) area. In addition to direct loss of habitat, the GSEP would fragment and degrade adjacent native wildlife communities, and could promote the spread of invasive non-native plants and desert tortoise predators such as ravens through providing perches. Routes of wildlife movement along washes or fringes of sand dunes would be cut off or reduced due to perimeter fencing and the impacted washes. Wildlife trailing along the fence to find suitable routes would be subject to increased vulnerability to predation. Additionally, fencing would provide perches for predators that would forage beyond the GSEP, preying upon such species as Mojave fringe-toed lizards. Gaps in fencing, if not maintained to standards, could trap desert tortoises, burro deer, badgers, kit foxes. Recommended avoidance and minimization measures as well as compensatory mitigation to offset direct, indirect, and cumulative impacts to desert tortoise and other special-status species, would assure compliance with state and federal laws such as the federal and state endangered species acts and regulations protecting waters of the state. With implementation of proposed Mitigation Measures, GSEP impacts to wildlife resources would be reduced to less substantial levels. Nonetheless, losses would occur to habitat for, or individuals of, the desert tortoise, American badger, desert kit fox, golden eagle, migratory birds, burrowing owl and Mojave fringe-toed lizard.

### *Mitigation for Desert Tortoise*

Mitigation Measures BIO-9 through BIO-11 would avoid and minimize potential take of desert tortoise during GSEP construction and operation. To offset the loss of desert tortoise habitat, mitigation measure BIO-12 recommends habitat compensation at a 1:1 ratio for desert tortoise

[1] The CEC document intertwined vegetation and wildlife resources in the mitigation measures and these have not been modified because as a whole they mitigate the impacts to vegetation and wildlife resources.

1,749 acres (i.e., acquisition and preservation of one acre of compensation lands for every acre lost). For GSEP impacts to 23 acres within the Chuckwalla Desert Tortoise Critical Habitat Unit, the mitigation ratio would be 5:1. This compensatory mitigation is consistent with recommendations from the California Department of Fish and Game (CDFG), the U.S. Fish and Wildlife Service (USFWS), and BLM guidance in the NECO. Proposed mitigation measure BIO-12 also requires that the land acquisitions be within the Colorado Desert Recovery Unit, and or? have potential to contribute to desert tortoise habitat connectivity and build linkages between desert tortoise populations and designated critical habitat. These conditions satisfy the California Department of Fish and Game's requirements under Section 2081 of the California Fish and Game Code. To address GSEP-related increases in ravens, a desert tortoise predator, proposed Mitigation Measure BIO-13 requires implementation of a Raven Monitoring, Management and Control Plan, as well as contributions to the USFWS Regional Raven Management Program.

## 4.21.7 Unavoidable Adverse Impacts

The GSEP and the proposed alternative would result in substantial impacts to sensitive wildlife resources, and would permanently diminish the extent and value of native animal communities in the region. Under the technology proposed in the three GSEP alternatives, the proposed Action, Dry Cooling, and Reduced Acreage Alternative, the native wildlife communities would be permanently lost, totaling 1,746 acres, 1,746 acres, and 950 acres, respectively.

The GSEP site provides habitat for desert tortoise, a species listed as threatened under the federal and state endangered species acts. The GSEP would impact approximately 1,750 acres of desert tortoise habitat, including 24 acres within the Chuckwalla Desert Critical Habitat Unit. Construction and operation of the GSEP would therefore require state and federal endangered species "take" authorization. In addition to direct loss of habitat the GSEP would fragment and degrade adjacent native plant and wildlife communities, and could promote the spread of invasive non-native plants and desert tortoise predators such as ravens.

# 4.22 Irreversible and Irretrievable Commitment of Resources

The National Environmental Policy Act (NEPA) requires an analysis of the significant irreversible effects of a proposed action. Resources irreversibly or irretrievably committed to a proposed action are those used on a long-term or permanent basis. This includes the use of nonrenewable resources such as metal, wood, fuel, paper, and other natural or cultural resources. These resources are considered nonretrievable in that they would be used for a proposed action when they could have been conserved or used for other purposes. Another impact that falls under the category of irreversible and irretrievable commitment of resources is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

The GSEP would irretrievably commit resources over the 30-40 year life of the project. After 30-40 years, the GSEP is planned to be decommissioned and the land returned to its pre-project state. This would indicate that potentially some of the resources on site could be retrieved. However, 30-40 years is a long time and many variables could affect the project over that period. In addition, it is debatable as to how well the site can recover to its pre-project state. Open desert lands and sensitive desert habitats can take a long time to recover from disturbances such as development. The GSEP site currently is not entirely undisturbed due to the site's use as a military training ground.

The GSEP is a renewable energy project intended to generate solar energy to reduce reliance on fossil fuels. Over the 30-40 year life of the GSEP, this renewable energy project would contribute incrementally to the reduction in demand for fossil fuel use for electricity-generating purposes. Therefore, this incremental reduction in expending fossil fuels would be a positive effect of the commitment of nonrenewable resources to the GSEP.

# 4.23 Short-term vs. Long-term Productivity of the Environment

The short-term uses of the environment as a result of the GSEP and its built alternatives include those typically found with solar energy development. Short-term impacts associated with construction activities described elsewhere in Chapter 4, Environmental Consequences, include effects to the natural environment, cultural resources, and recreation resources. These can be compared to the long-term benefits of the proposed action and its built alternatives, all of which would provide for the production of clean, renewable energy consistent with Federal and State goals to increase production of renewable energy to help reduce dependence on fossil fuels.

As discussed earlier in Section 4.22, Irreversible and Irretrievable Commitment of Resources, the proposed action and alternative could permanently damage sensitive desert habitats, which in turn could adversely affect the long-term productivity of the area. However, these built alternatives would all also provide a long-term benefit by providing electric power with minimal increase in the use of non-renewable resources such as fossil fuels, which would result in a benefit to air quality and a reduction in carbon-based emissions.